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THREE NEW SPECIES OF CITROPSIS, ALSO NEW VARIETIES OF ATALANTIA AND FORTUNELLA (RUTACEAE–AURANTIOIDEAE)

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With four plates

THIS PAPER is the last of three[1] published in this journal, describing the more important new genera, new species and new varieties brought to light in writing a synopsis of the Orange subfamily as a chapter in the first volume of "The Citrus Industry."[2]

The genus *Citropsis* includes plants found only in tropical Africa, rather closely related to *Atalantia* and somewhat remotely related to *Citrus*. They were formerly assigned to the old and much misunderstood genus *Limonia*. Engler described four new species of *Limonia* from tropical Africa in January, 1895[3] and in November of the same year[4] he established a new section, Citropsis, of the genus *Limonia* for these species. Three species were described and beautifully illustrated in folio size lithographic plates by Prof. De Wildeman in 1904.[5] The genus

[1]The two preceding papers in this series are:
SWINGLE, WALTER T. Clymenia and Burkillanthus, new genera, also three new species of Pleiospermium (Rutaceae-Aurantioideae). (Jour. Arnold Arb. 20: 250–263, pls. 1–3. April 1939.)
SWINGLE, WALTER T. Limnocitrus, a new genus, also new species of Wenzelia, Paramignya and Atalantia (Rutaceae-Aurantioideae). (Jour. Arnold Arb. 21: 1–25, pls. 1–4. Jan. 1940.)

[2]To be published by the University of California Press, Berkeley, Calif.

[3]ENGLER, A. Diagnosen neuer Arten. (Notizbl. Bot. Gart. Mus. Berlin, 1: 28–29. Jan. 1895.)

[4]ENGLER, A. Rutaceae. (Engler and Prantl, Nat. Pflanzenfam. III. 4: 189–190, fig. 109 E–H. Nov. 1895.)

[5]DE WILDEMAN, EMILE. Etudes de systématique et de géographie botanique sur la Flore du Bas- et du Moyen-Congo. (Ann. Musée Congo, Bot. sér. 5, 1: 159–161, pls. 40, 41, 43. 1904.) Plates of *Limonia Demeusei*, *L. Lacourtiana* and *L. Poggei* var. *latialata*.

Citropsis was established in 1914;[6] it was accepted and attentively studied by Engler in 1915[7] who added one new species, *C. Zenkeri*, and reduced one of his own to synonymy. In 1931[8] he noted briefly the "4 or 5" species then known and one or two doubtful synonyms. Finally, Prof. Pynaert, Director of the Colonial Botanic Garden in Belgian Congo, published in 1935[9] a popular account of the genus.

It now appears that there are three new species to be added to those already known, making a total of eleven species. As the number of species of *Citropsis* was increased by the repeated discovery of new ones, it became more and more difficult to distinguish them clearly from each other. Fortunately in 1914[10] valuable new characters were discovered in the size, proportion of parts, etc., of the pistil, which permitted a much clearer distinction of the species than had been possible hitherto.

Engler in the following year used to the full the pistil characters in describing and figuring *C. Zenkeri* and other species of the genus. Recently, by restoring herbarium material of flowers, fruits, etc. as nearly as possible to their natural fresh condition by the modified Juel technique[11] then imbedding them and cutting serial microtome sections, it has been possible to bring to light additional important anatomical and morphological characters shown by the disk, ovary, style and stigma, which still further facilitate the clear distinction of the species.

Citropsis Gilletiana Swingle et M. Kellerman, sp. nov.

PLATE 1, FIGS. 1–7, PLATE 2, FIGS. 1–5.

C. latialatae affinis sed differt (1) pistillo duplo longiore, (2) foliolis terminalibus 1/5–1/3 longioribus quam foliolis lateralibus adjacentibus, (3) disco cupulato, duplo altiore, (4) habitu arboreo 8–10 m. alto, nec fruticoso 3–4 m. alto. Ab *C. articulata* differt stylo dimidio breviore et duplo latiore.

Arbor 8–10 m. alta, ramulis junioribus glabris, 2.5–4 mm. diam., internodiis 2–6.5 cm. (vulgo 3.5–4.5 cm.), spinis gracilibus, acutis, 2–5 cm. longis, solitariis vel binis; foliis maximis, 3–5-foliolatis, 16–37.5 × 10–36

[6]SWINGLE, WALTER T. & MAUDE KELLERMAN. Citropsis, a new tropical African genus allied to Citrus. (Jour. Agric. Research, 1: 419–436, pl. 49, text figs. 1–7. Feb. 1914.)

[7]ENGLER, A. Die Pflanzenwelt Ostafrikas, 3: 758–760, fig. 354 A–N. 1915. (ENGLER & O. DRUDE. Vegetation der Erde, Vol. 9.)

[8]ENGLER, A. Rutaceae. (Engler & Prantl, Nat. Pflanzenfam. ed. 2, 19a: 347–349, fig. 158 A–N. 1931.)

[9]PYNAERT, E. Les Aurantiées du genre Citropsis. (Bull. Agric. Congo Belge, 26: 305–314, no. 3, 1935.)

[10]SWINGLE, WALTER T., & M. KELLERMAN, l.c.

[11]SWINGLE, WALTER T. New methods utilized in studying the taxonomy of the orange subfamily. (Jour. Wash. Acad. Sci. 29: 270. 1939.)

cm., margine crenulatis vel denticulatis, aliquando irregulariter leviter lobulatis, foliolis terminalibus 9–21 × 5–13.5 cm., lateralibus (semper minoribus quam terminalibus) 7–17 × 4–9.5 cm., petiolis late alatis obovatis vel obcordatis, 6–10 × 3.5–7.5 cm., segmentis rhacheos (1 vel 2) ellipticis vel obovatis, 3.5–9.5 × 1.5–7.5 cm. (vulgo 3.5–6 × 1.5–4 cm.); inflorescentiis axillaribus, racemosis, brevibus, 5–12 mm. longis; pedicellis 3–5 mm. longis instructis; floribus albis, numerosis, 1.5–2.5 cm. diam., 4-meris; calycis lobis triangularibus, acutis, 2 × 2 mm.; petalis 4, 16–18 × 4.5–5.2 mm.; staminibus 8, filamentis glabris, applanatis, liberis; disco 0.8–0.9 alto × 2.2–2.4 mm. lato, cupulato (0.3 mm. alto); pistillo (cum disco) 10–13 mm. longo, ovario ovoideo, 2.5–3.5 × 2.5–3 mm., 4-loculari, loculis 1-ovulatis, stylo 4.5–6 × 1.2–1.3 mm., stigmate depresso-globoso, 1.2–1.3 mm. alto, 2.5 mm. lato; fructibus subglobosis, 24–25 mm. diam., pedicellis 7–9 mm. longis, maturitate colore fructibus *Citri limoniae* similibus, cortice tenui (1–2.2 mm.) loculo quoque vesiculis pulpiferis numerosissimis granulis cerae flavae repletis; seminibus albis, glabris, fere 2–3 (aliquando nullo), ovoideis, 9.5–10 × 5–6 mm.

Tree 8–10 m. tall, young branches glabrous, 2.5–4 mm. diam., internodes 2–6.5 cm. (usually 3.5–4.5 cm.) long, spines slender, acute, 2–5 cm. long, solitary or in pairs; leaves very large, 3–5-foliolate, 16–37.5 × 10–36 cm., terminal leaflets 9–21 × 5–13.5 cm. lateral ones (always smaller than the terminal) 7–17 × 4–9.5 cm., petioles obovate or obcordate, 6–10 × 3.5–7.5 cm., segments of rachis (1 or 2) elliptical or obovate, 3.5–9.5 × 1.5–7.5 cm. (usually 3.5–6 × 1.5–4); inflorescences racemose, axillary, short, 5–12 mm. long, pedicels 3–5 mm. long; flowers white, numerous, 1.5–2.5 cm. diam., 4-merous, calyx lobes triangular, acute, 2 × 2 mm., petals 4, 16–18 × 4.5–5.2 mm.; stamens 8, filaments glabrous, flattened, free, disk 0.8–0.9 mm. high, 2.2–2.4 mm. wide, cupulate (0.3 mm. deep), pistil (including disk) 10–13 mm. long, ovary ovoid or barrel-shaped, 2.5–3.5 × 2.5–3 mm., 4-locular, locules with 1 ovule, style 4.5–6 × 1.2–1.3 mm., stigma depressed-globose, 1.2–1.3 mm. high, 2.5 mm. wide; fruits subglobose, 24–25 mm. diam., with pedicels 7–9 mm. long, lemon-colored when ripe, peel thin (1–1.2 mm.), locules with very numerous pulp vesicles filled with granules of yellowish wax; seeds white, smooth, usually 2–3 (often none), ovoid, 9.5–10 × 5–6 mm.

Type: Washington, D. C., Bureau of Plant Industry Citrus Greenhouse, tree grown from seeds sent from Kisantu, Belgian Congo by Père J. Gillet. *Swingle CPB No. 7800* G, PEI No. 109622, Mar. 10, 1939, flowering branch (Herb. National Arboretum, sheet No. 71502).

Cotype 1: From same collection, Fessenden natural color process,

preserved in soribitol derivatives, sealed in cellulose acetate (Herb. National Arboretum, sheet No. 71503).

COTYPE 2: From same tree, *Swingle,* coll. Aug. 1939, leafy branches and dried fruit (Herb. National Arboretum, sheet No. 71504).

COTYPE 3: Material from type tree. Serial microtome sections S. and T. No. 501 A, slides 1–17, and S. and T. No. 501 B, slides 1–14 (1156 cross sections of two flower buds); S. and T. No. 501 C, slides 1–5, No. 501 D, slides 1–4 (183 longitudinal sections of two flower buds) (Herb. National Arboretum).

TOPOTYPE 1: Belgian Congo, Kisantu, coll. *Père J. Gillet,* Mar. 21, 1913, C.P.B. No. 7711, with very young fruits (Herb. National Arboretum, sheet No. 71505).

OTHER MATERIAL: Jard. Bot. Brussels, *W. Robyns,* June 1938, from a tree grown from seeds collected by Père J. Gillet, Kisantu, Belgian Congo in 1906. (Herb. National Arboretum, sheet No. 71506, also photographs and serial microtome sections S. and T. No. 670.)

This giant species of *Citropsis,* the largest in the genus, which grows to a height of 8 or 10 meters, probably has also the largest leaves of any species although two other species have leaves almost as large. However, one of these species, *C. articulata,* has very different flower characters, the style being twice as long but only half as wide as that of *C. Gilletiana;* the other species, *C. latialata,* was found from a study of the type material to have pistils only about half as long as those of *C. Gilletiana* and also with much larger oil-glands in the swollen stigma.

The type tree of *C. Gilletiana* was grown from seed sent by Père J. Gillet from his Botanic Garden at Kisantu in the lower Congo valley in Belgian Congo in March 1913. Unlike *C. Schweinfurthii,* growing alongside in the greenhouse, the young tree did not flower for many years and then only sparingly. For the last few years it has flowered and fruited profusely. For many years it has grown vigorously and produced enormous leaves, both 3- and 5-foliolate. A 3-foliolate leaf at the base of a vigorous water-sprout was 28.5 cm. long and 31 cm. wide. The terminal leaflet measured 20.5 × 14 cm., the two lateral leaflets 16.5 × 9.5 cm. The largest leaflets had 7–10 principal lateral veins, raised on the under surface and sunken on the upper surface. The surface of the leaflet was usually more or less bullate because of the upward curving of areas of the leaf surface limited by the principal veins and their cross veinlets. The leaflet margins were crenulate or even subserrate, sometimes irregularly incised. The winged petiole, cordate in outline, measured 8.5 × 7.2 mm. A large 5-foliolate leaf higher up on the same shoot,

measured 37.5 cm. long and 36 cm. wide; the terminal leaflet (somewhat deformed) was 18 × 10 cm. The two highest lateral leaflets were 18.5–19 × 10.5–11 cm. One of the lower leaflets was 16 × 10.25 cm. (the other was imperfect). The elongate, elliptical, winged rachis segments measured 9.5 × 4.5 cm., the elliptical winged petiole about 10 cm. long and about 7.5 cm. wide (one side defective). These are the largest leaves and leaflets yet reported on a near-citrus or true citrus fruit tree, though they are greatly exceeded in size by the leaves of some species of *Clausena*.

Citropsis Gilletiana is an important disease-resistant rootstock on which the commonly cultivated species of *Citrus* grow well in Belgian Congo and remain free from injury by larvae of a beetle (*Monohammus* sp.) which attacks the bark of all species of *Citrus* (even the highly resistant sour orange) and makes them liable to gum disease (caused by a fungus, *Phytophthora* sp.).[12]

In the Colonial Botanic Garden at Eala on the Congo river it was found that *C. Gilletiana* makes an excellent rootstock for many of the cultivated varieties of *Citrus* (such as sweet orange, mandarin, grapefruit, and lemon); in fact they all grew better when grafted on *C. Gilletiana* than on sour orange.[13]

Citropsis Gilletiana was introduced into the National Botanic Garden at Brussels, Belgium, by seeds sent in 1906 by Père Gillet from Kisantu, Belgian Congo. Flowers from one of the plants at Brussels kindly sent to us by Director W. Robyns in 1938, and after being restored by the Juel method could not be distinguished from those from the type tree growing in the Citrus greenhouse at Washington.

There are also living plants of this species growing and fruiting freely in a greenhouse in the Colonial Garden at Laeken, Belgium. An excellent figure of this plant published by Goossens,[14] shows clearly terminal leaflets larger than the lateral ones as in typical *C. Gilletiana*.

As the above species, *C. Gilletiana*, has been, to date, inadequately distinguished from another large-leaved species, *C. latialata*, also native in the Congo basin, it is desirable to supplement De Wildeman's excellent description of the leaf characters and his beautiful lithographic plate of this latter species with a description of the flower parts.

[12]Staner, P. Maladies du Citrus au Congo Belge. (Bull. Agric. Congo Belge, 20: 364–373, figs. 170–176. 1929.)

[13]Pynaert, l.c., 314.

[14]Goossens, Victor. Note sur le Limonia Poggei Engl. var. latialata De Wild. employé pour la greffe de l'oranger au Jardin Botanique d'Eala. (Bull. Agric. Congo Belge, 15: 157–162, figs. 42–45. 1924.)

Citropsis latialata (De Wild.) Swingle & M. Kellerman in Jour. Wash. Acad. Sci. **28**: 533. 1938. PLATE 2, FIGS. 6–10.

Limonia Poggei var. *latialata* De Wildeman in Ann. Mus. Congo. Bot. 5 sér. **1**: 160. pl. 43. 1904.

TYPE: Belgian Congo, Sankaru-Kasai, Ikongu. *L. Gentil No. 1,* flowering branch (Herb. Jard. Bot. de l'État, Brussels; photographs, serial microtome sections S. and T. 397 A, slides 1–6 [429 cross sections of half of one flower], No. 397 B, slides 1–2 [26 longitudinal sections cut to the median line of the same flower] in Herb. National Arboretum).

In the original description of his variety, *latialata,* De Wildeman says, in translation: "Shrub 3–4 m. tall; . . . leaves odd-pinnate with two pairs of lateral leaflets . . . petiole 3–8.5 cm. long and 1.5–5 cm. wide, . . . rachis [winged], reaching 4.5 cm. diam., leaflets oblong, narrowed into a very short petiolule; cuneiform at apex and at base; . . . 6–15 cm. long and 2–7 cm. wide, margins irregularly denticulate, terminal leaflet regular, cuneiform at base, of the same size as the lateral [leaflets] . . . flowers white with the odor of orange [flowers]; inflorescences axillary or terminal, ovary ovoid, terminated by a style twice as long, surmounted by a trilobed stigma."

A note states that the material brought by L. Gentil was in flower when collected but "the petals fell off during the preparation," fruits were not seen.

A single flower from the type specimen was kindly supplied for study by Prof. W. Robyns, Directeur du Jardin botanique de l'État at Brussels and was restored by the modified Juel method, imbedded in paraffin and cut into serial microtome sections. First the pistil was cut into 26 longitudinal sections until a section was obtained exactly through the center; then the paraffin block was turned at right angles and 429 cross sections, 20 μ thick, were cut, including the entire length of the pistil, disk, calyx and pedicel.

The calyx is 4-merous, the lobes about 1.2 mm. wide and 1.5 mm. long, thick in the middle but with thin edges; disk shallow, cup-shaped, 0.3–0.4 mm. tall and 1.1–1.2 mm. wide, pistil 6.4 mm. tall, including the shallow disk, ovary ovate, 1.8 mm. tall and 1.6 mm. wide, merging rather abruptly into the style which is 0.8 mm. diam. at junction with the ovary and nearly 1 mm. where it joins the stigma; stigma cushion-shaped, 1.5 mm. wide and 0.5–0.6 mm. high, more or less 4-lobed, with 4 medium-sized oil-glands.

This species differs greatly from *C. Gilletiana* with which it has been confused. *Citropsis latialata* is a small shrub instead of a large tree (up to 10 m. high) and has somewhat narrower leaflets and the terminal

leaflet is of about the same size or only very slightly larger than the adjacent lateral leaflets. The pistils are only a trifle more than half as long as those of *C. Gilletiana*, and show a shorter, less deeply cupped nectary and a more flattened stigma with 4 medium-sized oil-glands, distinctly larger and fewer than those occurring in the stigma of *C. Gilletiana*.

Citropsis Tanakae, Swingle et M. Kellerman, sp. nov.

PLATE 3, FIGS. 1–5.

Frutex vel arbor, ramulis gracilibus, 1.5–3 mm. diam., spinis solitariis, axillaribus, gracilibus brevibusque (5–10 mm.); internodiis 1.5–2.5 cm.; foliis simplicibus, rotundato-lanceolatis, 8–10 × 6–3 cm., apicem versus sensim in acumen crassum obtusum attenuatis, basi late cuneatis, nervis lateralibus numerosis, utrinque 10–12, sub angulo 75°–80° divergentibus, margine apicem versus regulariter sed tenuiter crenulatis, ad basin subintegris, in petiolum decurrentibus; petiolis brevissimis (3.5–4 mm.), apteris, gracilibus (1–1.5 mm. latis), glabris, cum lamina foliorum non articulatis; inflorescentiis brevissimis, paucifloris, axillaribus; alabastris parvis (immaturis?) circa 8 × 3 mm., pedicellis brevibus 2–3 mm. (vel plus?) longis et 0.5–0.75 mm. diam. instructis, calyce glandulis oleiferis asperato, glabro, lobis 4, 0.3–0.4 mm. longis, subacutis, marginibus tenuibus scariosisque, glandula oleifera singula magna ad apicem instructis, petalis 4, circa 7 × 3 mm. in alabastro, glabris, glandulis multis oleiferis instructis, ad apicem numerosioribus, staminibus 8, circa 6 mm. longis, filamentis glabris, circa 5 mm. longis, applanatis, 2 vel 3 in fasciculis cohaerentibus, antheris circa 3 mm. longis, ad apicem connectivi glandula oleifera instructis, disco cylindrico, glabro, cupulato, 0.10–0.15 mm. alto, pistillo 5.6 mm. longo, ovario 4-loculari, ovoideo, 0.8 × 0.93 mm., apice rotundato, glandulis oleiferis magnis super quemque loculum destitutis; stylo longo, gracili (4.6 × 0.3–0.4 mm.), stigmate depresso-globoso, 0.7 mm. alto, 0.9 mm. lato, 5–7 glandulis oleiferis magnis instructo.

Branches slender, 1.5–3 mm. diam., with solitary, axillary, slender, short spines; internodes 1.5–2.5 cm. long; leaves simple, broadly lanceolate, tapering gradually (or slightly acuminate) into a short, thick, blunt acumen, 8–10 × 6–3 cm., base broadly cuneate with the margins slightly decurrent into upper part of petiole, lateral veins numerous, 10–12 on each side, arising at angles of about 75°–80° with the midrib, margins regularly but shallowly crenulate on upper half, subentire below; petioles very short (3.5–4 mm. long), wingless, slender (1–1.5 mm. wide), glabrous, not articulated with the leaf-blade; inflorescences very short, few-flowered, axillary; flower buds (immature?) small, about 8 × 3 mm., borne on short slender pedicels, 2–3 mm. (or more?) long, 0.5–

0.75 mm. diam.; calyx roughened with numerous oil-glands, glabrous, calyx lobes 4, short (0.3–0.4 mm.), with thin scarious edges, with a single rather large oil-gland near the subacute tip (Plate 3, figure 2), petals 4, about 7 × 3 mm. (in the immature bud), glabrous, with many medium-sized oil-glands, more abundant at the pointed tips, stamens 8, about 5.5–6 mm. long, filaments glabrous, somewhat flattened, broad at the base where they cohere in groups of 2 or 3 for some distance (about 2.8 mm.), anthers about 3 mm. long, with a single small oil-gland near the top of the connective, disk cylindrical, glabrous, shallow, cup-shaped, fitting rather closely over the base of the ovary for about 0.1 mm. with a few small oil-glands on the margin of the cup, pistil 5.6 mm. long, ovary 4-loculed, ovoid, 0.93 mm. long, 0.8 mm. wide, rounded at top without a large oil-gland over each locule, style long and slender (4.6 mm. long, 0.3–0.4 wide), slightly contracted where it joins the ovary in which it is very slightly countersunk, slightly expanded at the apex where it merges into a depressed globose stigma, 0.7 mm. high and 0.9 wide, containing several (5–7) large oil-glands.

TYPE: Sierra Leone, *Afzelius,* a twig with a single flower bud (Herb. Univ. Uppsala; one leaf with petiole; photographs and serial microtome sections S. and T. No. 226 A, slides 1–6, [454 transverse sections of 1 flower bud] in Herb. National Arboretum.)

This species is known only from a single twig, about 20 cm. long, with 7 leaves and a single flower bud, collected in Sierra Leone between 1794 and 1796 by the Swedish botanist Afzelius who identified it as *Citrus Medica,* doubtless because the petioles were not articulated with the leaf-blade. Prof. T. Tanaka, about ten years ago, saw Afzelius' specimen in the herbarium of the University of Uppsala, in Sweden, and perceived at once that it did not belong to the genus *Citrus,* but was instead a species of *Citropsis.* He never published this species, but did figure it.[15] It is, therefore, appropriately named in his honor. Thanks to the kindness of the Curator of the Herbarium at the University of Uppsala, a single leaf and the unique flower bud were sent to us for study. By restoring the bud and cutting it into serial microtome sections by the Juel method discovered at the University of Uppsala, it has been possible to prove beyond doubt that Afzelius' plant is a new species of *Citropsis* very different from any of the other ten species now known. This very old material could not be restored as well as usual. Nevertheless, it was possible to work out the flower structure in minute detail.

This remarkable species is unique in the genus because of its simple

[15]TANAKA, TYOZABURO. Kenkitsu no kenkyu, Citrus Studies, p. 78, fig. 71, left, 1933, a very small figure labeled *"Citropsis citrifolia,"* nomen nudum.

leaves with very short wingless petioles (only 1/20 as long as the leaf-blade and not articulated with it). All other species of *Citropsis* have odd-pinnate leaves, 3–7-foliolate or occasionally (in *C. gabunensis*) 1-foliolate leaves with petioles that are, however, never less than 1/8 as long as the leaf-blade. *Citropsis Tanakae* has flowers somewhat resembling the subgenus Afrocitrus (see page 126) in having a subglobose stigma distended with large oil-glands, borne on a slender style, but lacks the large oil-glands, one at the top of each locule, which characterize the species of this subgenus. Not until fully developed flowers and mature fruits are available for study will it be possible to determine the exact relationships of *C. Tanakae*.

Besides being one of the most distinct species of the genus, it is also the northernmost species in Africa, occurring in Sierra Leone, some 500–600 kilometers northwest of *C. mirabilis* (in the Ivory Coast in West Africa) from which it differs in almost all of its characters.

Citropsis Daweana Swingle et M. Kellerman, sp. nov.

PLATE 3, FIG. 6.

Frutex vel arbor parva, 3–5 m. alta, ramulis primo angularibus, demum cylindricis, 2–4 mm. diam.; internodiis 2–3 cm. longis; spinis axillaribus, solitariis, brevibus, rectis, 1–2.5 cm. longis, ad basim 2–4 mm. diam., brevioribus obtuse, longioribus (1.5–2.5 cm.) acute acuminatis; foliis 5–7-foliolatis, foliolis ellipticis vel rhomboideis, apice truncato-rotundatis, terminalibus basi anguste cuneato 5–5.8 × 2–2.4 cm., lateralibus basi late cuneatis vel rotundatis, 2–4.5 × 1.5–2.4 cm., margine tenuiter crenulatis vel subintegris, utrinque leviter pubescentibus, praecipue secus nervos et ad marginem; petiolis fere apteris vel apteris, 1.2–2.2 × 0.15 cm., pubescentibus, segmento racheos inferiore 2–2.5 cm. longo, spatulatis, basi anguste, apicem versus late (3–6 mm.) alatis, apice rotundato, segmento superiore racheos elliptico, 5–8 mm. lato, nec spatulato; flores fructusque ignotae.

A shrub or small tree, 3–5 m. high, branchlets at first angular, soon cylindrical, 2–4 mm. diam.; internodes 2–3 cm. long; spines axillary, solitary, short, straight, 1–2.5 cm. long, 2–4 mm. diam. at base, shorter ones blunt-pointed, the longer ones (1.5–2.5 cm.), sharp-pointed; leaves 5–7-foliolate, leaflets elliptical to rhomboid, bluntly rounded at the tip, terminal one narrowly cuneate at base, 5–5.8 × 2–2.4 cm., lateral ones broadly cuneate or broadly rounded at base, 2–4.5 × 1.5–2.4 cm. margins finely crenulate or subentire, sparingly pubescent on both sides especially along the veins and at the margins; petioles nearly or quite wingless, 1.2–2.2 cm. long, 1.5 mm. wide, pubescent, basal segments of

rachis 2--2.5 cm. long, spatulate, narrowly winged at base and broadly winged (3–6 mm.) at apex, which is rounded, second rachis segment elliptical, 5–8 mm. wide, not spatulate; flowers and fruits unknown.

TYPE: Madanda Forest, Portuguese East Africa (Mozambique). *Dawe No. 443* (Type, Herb. Brit. Mus.: fragment in Herb. National Arboretum. PARATYPE, Herb. Kew; photograph in Herb. National Arboretum).

Unfortunately no flowers or fruits of this species are available for study. The leaves cannot be mistaken for those of any other species as they have a wingless petiole (although the rachis segments are clearly winged) and have leaflets more or less pubescent on both surfaces.

This species has the appearance of being more or less xerophytic, while the other species are evidently mesophytes growing, or at least, starting as seedlings, in the shade of larger trees in the tropical rain forests. The type material seems to show *kurztriebe* like the leaf and fruit spurs of *Poncirus* and some of the hard-shelled citrus fruit trees (subtribe Balsamocitrinae).

The leaf, petiole and rachis characters of this species show a great similarity to those of certain forms of *Hesperethusa crenulata* (Roxb.) Roem. from peninsular British India. However, certain forms of *Citropsis gabunensis* (Engl.) Swing. & M. Kell. have leaves and petioles greatly resembling those of *Citrus* but have flowers and fruits unmistakably belonging to *Citropsis*. Only the study of flowers and fruits can reveal the exact relationships of *Citropsis Daweana*.

Citropsis gabunensis var. **Lacourtiana** (De Wild.) Swingle et M. Kellerman, comb. nov.

Limonia Lacourtiana De Wildeman in Ann. Mus. Congo Bot. 5 sér. 1: 159, pl. 50. 1904.

Differt a typo fructu cortice molli, pulpa tenera succosa suavissima, seminibus parvis (saepe nullo).

Fruits subglobose, 1.8–2 cm. diam., yellow-orange when ripe, peel 2–2.5 mm. thick, rather soft, pulp tender, juicy and of very agreeable flavor, seeds few or none, plump, subglobose, bluntly conical at one end, 11 × 8.5–9 mm.

TYPE: Bombaye, Sankuru (Lualaba-Kasai), Belgian Congo, *L. Gentil No. 93*, fruiting branch (Herb. Jard. Bot. de l'État, Brussels; part of type collection [leafy branch and fruit], photographs and serial microtome sections S. and T. No. 532 A, slides 1–5 [14 transverse sections of a fruit from type specimen] in Herb. National Arboretum).

The type specimen of *Limonia Lacourtiana* was kindly loaned to us by

Dr. W. Robyns, Director of the Jardin Botanique de l'État at Brussels. It consisted of a single fruiting branch collected in May 1902 with a number of half-grown and three nearly mature fruits, most of them seedless but one (or two?) having a single, yellowish brown, rather large, plump, short-ovoid seed, 11 × 8.5–9 mm., with a very hard smooth testa, having a smooth-edged hilum 2 × 1 mm. Gentil's original field label attached to the type sheet calls the plant "un mandarinier sauvage" and notes its "fruit délicieux." The fruits occur in dense axillary clusters and are borne on pedicels 8–13 mm. long which in turn are densely crowded on a very short peduncle only 4–10 mm. long.

Two species of *Citropsis* which have fruited in the United States, *C. Schweinfurthii* and *C. Gilletiana,* both produce an abundance of small orange-like fruits but they are not edible as the pulp vesicles contain numerous granules of a waxy substance of disagreeable flavor.

Doubtless *C. gabunensis,* belonging, as it does, to a very different group (the type of a new subgenus discussed below), does not produce this ill-flavored wax. The species itself has fruits so full of plump seeds as to leave very little space for pulp. The variety *Lacourtiana* on the contrary usually has seedless fruits that are filled with high-flavored pulp.

TWO SUBGENERA IN CITROPSIS

In making a detailed study of all the species of the genus *Citropsis,* it soon became evident that the nine species of which flowers and fruits are known fall naturally into two groups clearly distinguished by characters having taxonomic importance in this genus.

I. Eucitropsis Swing. et M. Kell., subgen. nov., foliolis magnis rhachibus late alatis, pistillo crassiusculo, ovario ovoideo sine glandulis oleiferis ad apicem cujusque loculi, stigmate depresso-globoso sine glandulis oleiferis magnis.

1. *Citropsis Schweinfurthii* (Engl.) Swing. & M. Kell. (Type species)
   Uganda, East African plateau.
2. *C. angolensis* Exell.
   Angola, Southwest Africa.
3. *C. articulata* (Willd.) Swing. & M. Kell.
   Gold Coast, West Africa.
4. *C. mirabilis* (A. Chev.) Swing. & M. Kell.
   Ivory Coast, West Africa.
5. *C. Gilletiana* Swing. & M. Kell.
   Congo River Valley, Central Africa.
6. *C. latialata* (De Wild.) Swing. & M. Kell.
   Congo River Valley, Central Africa.

These species close to the type of the genus have large flowers much like those of *Citrus*, with rather thick pistils (particularly a thick style); the ovary locules do not show a large oil-gland at the tip of each locule and the stigma shows only small or medium-sized oil-glands; the leaves are large, acute at the tip, but not acuminate or caudate; the petioles and rachis segments are very broadly winged.

II. AFROCITRUS Swing. et M. Kell., subgen. nov., foliolis parvis, rhachibus anguste alatis vel apteris, pistillo parvo, ovario obclavato vel obovoideo, cum glandulis oleiferis magnis ad apicem cujusque loculi, stigmate subgloboso glandulis oleiferis magnis instructis.

7. *C. gabunensis* (Engl.) Swing. & M. Kell. (Type of subgenus)
Gabon, West Africa.

7a. *C. gabunensis* var. *Lacourtiana* (De Wild.) Swing. & M. Kell.
Sankuru River Valley, Belgian Congo.

8. *C. Le-Testui* Pellegrin
French Congo, Congo River (lower valley).

9. *C. Zenkeri* Engler
Cameroons, West Africa.

The three species that constitute this subgenus all have small leaflets with acuminate or caudate tips and all, except *C. Le-Testui*, have petioles and rachis segments narrowly winged; the flowers are small or very small and the pistils (especially the style) extremely slender; the tip of the ovary is swollen by 4 large oil-glands, one at the tip of each locule; the stigma is unusually large (more than twice as broad as the tip of the style) and distended by very large oil-glands.

III. INADEQUATELY KNOWN SPECIES OF UNCERTAIN RELATIONSHIPS.

10. *C. Tanakae* Swing. & M. Kell.
Sierra Leone, West Africa.

11. *C. Daweana* Swing. & M. Kell.
Mozambique, Southeast Africa.

The mature flowers and fruits of *C. Tanakae* and the flower buds, flowers and fruits of *C. Daweana* are unknown. Both of these species have many characters that distinguish them sharply from all the other species of *Citropsis*, and they do not now appear to belong to either one of the two subgenera described above.

In addition to the 11 species mentioned above, there are one or two other plants such as *Limonia Demeusei* De Wild. and *L. Poggei*, of which the flowers are still unknown; these may possibly prove to be be distinct species of *Citropsis* when adequate material is available for study.

THREE NEW VARIETIES IN THE GENUS ATALANTIA

Atalantia racemosa var. **Henryi** var. nov. PLATE 4, FIGS. 1–4.

Differt a typo (1) foliis majoribus, (2) basi fere cuneatis nec rotundatis, (3) pedicellis florum longioribus, (4) ovariis 4-locularibus nec 2- vel 3-locularibus.

A small tree 4–7 m. high, ultimate branches slender, 2–3 mm. diameter, soon terete, spineless; leaves glabrous, lanceolate, 9–13 cm. long and 3.5–5.4 cm. wide, short-acuminate at apex, acumen 5–8 × 4–3 mm., tip blunt or even slightly emarginate, cuneate at base, lateral veins very numerous, 15–30 on each side not all clearly marked, arising at angles of 50°–70° with the midrib, margins subentire, petioles 5–10 × 1.2–2 mm., glabrous, coriaceous, more or less wrinkled, with a deep narrow channel 0.5–0.8 mm. wide on upper side, articulated with the leaf-blade; inflorescences single axillary racemes, 1–2.5 cm. long, with 5–15 flowers borne on slender pedicels 3–5 mm. long, peduncles, pedicels and calyx pubescent, flower buds subglobose, 3–4 mm. diam., calyx lobes rounded, 1.8–2 mm. long, 2–3 mm. wide, margins thin and ciliate, petals oblong, rounded at apex, stamens 8, filaments glabrous or very sparingly short ciliate, more or less cohering irregularly in groups, sometimes almost to the tips, in other flowers free almost to base, anthers about 2 mm. long, attached near the middle to the narrowed filament, connective bearing 1 medium-sized oil-gland near tip; disk cup-shaped, 0.5 mm. high, 1.5 mm. wide, pistil 3.5–4 mm. long, ovary ovate 1.5 × 1.5 mm., 4-locular with two ovules in each locule, with one medium-sized oil-gland at top of each locule, style short and thick, 2 mm. long (including stigma), 0.7–0.9 mm. wide, stigma not clearly distinguished from the style, about 0.9–1 mm. wide, with 4 stylar canals with 2 medium-sized oil-glands in the space between each two stylar canals (Plate 4, figure 3), fruits subglobose, 1.5–2 mm. diam., borne sparingly (1–2?) on each raceme on pubescent pedicels 3–5 × 1.5–2 mm., with numerous sessile pulp-vesicles (scanty in ripe fruit from seed pressure ?), seeds 1–3, ovoid-oblong, 12 × 6–8 mm., monoembryonic.

TYPE: Southern Yunnan, Szemao, alt. 1220 m., *A. Henry No. 12930*, 2 flowering branches (Herb. Arnold Arboretum; photographs, fragments and serial microtome sections S. and T. No. 660 A, slides 1–5, and 660 B, slides 1–5 [464 cross sections of 2 flower buds], No. 660 C, slides 1, 2 and 660 D, slides 1, 2 [156 longitudinal sections of 2 flower buds] in Herb. National Arboretum).

COTYPE: Same locality, same collection, *A. Henry No. 12930*, flow-

ering branch (U. S. National Herbarium, sheet No. 459370; photographs and serial microtome sections S. and T. No. 176 A, slides 1–5, and 176 B, slides 1–5 [559 cross sections of 2 flower buds], No. 176 C, slides 1–3, and 176 D, slides 1–3 [138 longitudinal sections of 2 flower buds] in Herb. National Arboretum).

OTHER MATERIAL: China, Southern Yunnan, Chi-li District, Youlouh shan, alt. 1100 m., *C. W. Wang No. 78101;* Chi-li Distr. Man-ya, alt. 1800 m., *Wang No. 78013;* Chi-li Distr., Man-ya, alt. 1200 m., *Wang No. 29051;* Chi-li Distr., Kuen-ger, alt. 1100 m., *Wang No. 79434;* all 4 numbers fruiting branches (Herb. Arnold Arboretum; photographs, fragments and serial microtome sections of fruits of No. 78013, S. and T. No. 650 A, slides 1–4 [13 cross sections of 1 fruit] in Herb. National Arboretum).

This variety is based on a flowering specimen from Szemao, Yunnan, (lat. 22° 45′ long. 101° 5′) at an altitude of about 1220 m. and fruiting specimens from Chi-li District about 100 kilometers to the south-southwest at altitudes from 1100 to 1800 meters. It resembles the typical *A. racemosa* of western peninsular India in many ways, but has larger leaves, flowers with decidedly longer pedicels, and the ovary is 4-locular, not 2- or 3-locular as usually given for the species. The subglobose stigma of the variety shows on cross section 4 stylar canals and between each 2 stylar canals 2 small oil-glands (Plate 4, figure 4). Flowers of material of the species from Bombay and also from "Malabar, Concan, etc., coll. Stocks, Lau etc." (both from the Gray Herbarium) show the stigma scarcely larger than the style with two stylar canals (corresponding to the 2 locules of the ovary) and with no oil-glands between the stylar canals (Plate 4, figure 5). These may be male flowers with a defective pistil such as are common in the lemon and some other species of *Citrus*. However, the original description of *Atalantia racemosa* Wight[16] and the excellent plate accompanying it, describe and illustrate a 3- or 4-lobed capitate stigma that very probably had oil-glands within to cause it to expand to slightly more than twice the diameter of the style.

Other figures show the ovary to have 3 or 4 locules as described. Most botanists of British India have described the species as having the ovary with 2 or 3 locules.

For the present the south Chinese plant can probably best be classed as a variety of *A. racemosa*.

[16]In Hooker's Jour. Bot. 1: 64, pl. 122. January 1834. The name *A. racemosa* is often erroneously cited as having been published by Wight and Arnott in Prodromus Ind. Or. 1: 91, but this work had not been published as late as March 22, 1834, and probably did not appear until April 1834.

Atalantia Roxburghiana var. **Kerrii**, var. nov.

A typo differt (1) foliis coriaceis, (2) brevioribus latioribusque, (3) apice obtusioribus, (4) inflorescentiis multo longioribus.

A small tree up to 5 m. tall, ultimate branches at first green and slightly angular, soon brownish, terete and faintly striate longitudinally; internodes 1.2 cm. long; leaves thick and leathery, broadly oval or elliptical, smaller ones lanceolate, 9–15 cm. long (including the petiole), 3–8 cm. wide (usually 6–8 cm. wide) tapering to a blunt apex, broadly cuneate at base with numerous small oil-glands scattered over the whole surface of the leaf-blade but fewer near the margins which are entire or faintly crenulate and slightly thickened at the very edge, lateral veins 7–12 pairs, nearly straight or slightly curved, forking at 5/6 to 6/7 of the distance to the margin, making angles of 50°–60° (rarely 65°–70°) with the midrib, with numerous small lateral veinlets that anastomose; petioles stiff, glabrous, wrinkled, with a shallow channel on the upper side, 1–2 mm. wide, 0.4–0.5 mm. deep; inflorescences axillary, paniculate (?), 2–10 cm. long, peduncle 1–2 mm. diam., pedicels 5–11 × 1.25–1.8 mm.; fruits subglobose, 1.5–1.8 cm. diam., peel covered with large, slightly sunken oil-glands 0.5–0.9 mm. diam., 3-locular, pulp-vesicles numerous, sessile, 3–5 mm. long, filling all the space not occupied by the seeds, seeds ovoid, 11.5–12 × 10–11 × 6–8 mm., with a very thin papery testa (which swells and separates from the embryo in hot water), monoembryonic.

Type: Thailand (Siam), Sam Roi Jawt, alt. 300–500 m., *A. F. G. Kerr No. 10943*, July 12, 1926, fruiting branches (Herb. Univ. Aberdeen; photographs, fragments and serial microtome sections of a fruit, S. and T. No. 684 A, slides 1–4 [12 cross sections] in Herb. National Arboretum.)

This remarkable *Atalantia* has very large, very broad, coriaceous leaves; unfortunately it is known only in the fruiting stage, but because of its leaf-characters it differs strikingly not only from *A. Roxburghiana* but also from the other species known from the Indo-Chinese region. As the species of *Atalantia* are, most of them, very variable in many of their characters, it seems best to consider this striking form as a variety of *A. Roxburghiana* Hook. f., not uncommon in the Malay peninsula and reported from French Indo-China.

I take pleasure in naming this variety in honor of Dr. A. F. G. Kerr who has done so much to make known the rich flora of Thailand.

Atalantia Roxburghiana var. **kwangtungensis** (Merr.), comb. nov.

A. kwangtungensis Merr. in Philip. Jour. Sci. **21**: 496. 1922.

This variety differs from the species in having usually 5-merous flowers (instead of 4-merous) and staminal filaments cohering from the base for about half their length instead of being free.

Both this variety and var. *Kerrii*, as well as the species *A. Roxburghiana*, are said to be spineless. Tanaka (Jour. Bot. **68**: 62. 1930) referred *A. kwangtungensis* to *A. Roxburghiana* and Merrill (Lingnan Sci. Jour. **7**: 311. 1931) accepts this reduction. However, in view of the presence of characters in *A. kwangtungensis* not yet found in typical *A. Roxburghiana* it appears possible, even probable, that the South China form deserves to be recognized as a variety, as done here, pending further study of the *A. Roxburghiana* complex of forms.

A NEW VARIETY OF FORTUNELLA

Fortunella Hindsii var. **Chintou**, var. nov. PLATE 4, FIG. 6

A typo differt (1) foliis majoribus, tenuioribus, (2) spinis brevioribus gracilioribusque, (3) fructibus majoribus, 12–15 mm. diam., (4) chromosomatibus diploideis (gametis n = 9 et cellulis, 2n = 18) nec tetraploideis, (5) floribus minoribus cum petalis et lobis calycis brevioribus et disco breviore.

This variety differs from the parent species in its larger, thinner and somewhat narrower leaves, 3.5–8 × 1.5–2.5 cm., shorter and more slender spines and larger, slightly depressed globose fruits, 12–15 mm. in diam. (Plate 4, figures 6 and 7). It has the normal diploid number of chromosomes (9 in the gametes and 18 in the somatic cells) instead of twice as many (18 and 36) as in the parent species. It has also distinctly smaller flowers with petals 5–6 × 2.5–4 mm. instead of 6–7 × 4–5 mm. as in the tetraploid species, blunter and much shorter calyx lobes, 0.5–0.6 mm. long instead of 0.8–1.2 mm. as in the species; the disk is also somewhat narrower and evidently shorter.

TYPE: Cut from a plant brought from Japan in 1927 by W. T. Swingle C.P.B. No. 909, now growing at the Bell Plant Introduction Garden near Glenn Dale, Md., under P.E.I. No. 71293 *Swingle*, fruiting branch (Herb. National Arboretum sheet No. 71507).

This striking dwarf, small-fruited kumquat is the *chin tou* or golden bean of the Chinese, well known and commonly cultivated for centuries in China and Japan but unknown in other countries. It is highly probable that it is the diploid state of *Fortunella Hindsii* which grows wild in the mountains of southeastern China but is apparently not known in culture. This wild form is an autotetraploid state, the only one known in a wild condition.

Dr. A. F. Longley kindly examined the pollen mother cells of this variety and discovered they had only nine chromosomes in the nuclei of the gametic cells (18 in the nuclei of the somatic cells), as in all the wild species of *Citrus Fortunella* and other genera of the Orange subfamily that have been studied. He had previously studied the species itself, the wild *Fortunella Hindsii*,[17] and found the gametic nuclei contained eighteen chromosomes and the somatic cells were tetraploid, containing 36 chromosomes. This is the only known tetraploid wild plant of the Orange subfamily, although tetraploid mutations of several species of *Citrus* have arisen under culture. None of them is cultivated, being dwarfish with small fruits. We have here the unique case of a diploid mutation suitable for culture arising from a tetraploid wild form.

EXPLANATION OF PLATES

Plate 1

Citropsis Gilletiana Swingle et M. Kellerman. All figures of material collected from the type tree. Figure 1, part of type herbarium specimen.

Figure 1. Flowering twig. ½ nat. size.

Figure 2. Flowers and very young flower buds above. Nat. size.

Figure 3. Pedicel, calyx, disk and pistil. × 3.7.

Figure 4. Longitudinal section of nearly mature flower bud. × 4.5.

Figure 5. Cross sections of flower bud showing cup-shaped disk between stamens and ovary base, also corolla and tips of calyx lobes. × 4.5.

Figure 6. Cross section of ripe fruit with seeds. Nat. size.

Figure 7. Ripe fruit attached to twig. Nat. size.

Plate 2

Citropsis Gilletiana Swingle et M. Kellerman. Figures 1–4 from type material. Figure 5, plant in Jardin botanique d'Eala, Belgian Congo.

Figure 1. Three stamens. × 3.7.

Figure 2. Serial cross sections of ovary, staminal filaments and part of corolla. × 4.2.

Figure 3. Serial cross sections of stigma below apex, surrounded by petals. × 4.2.

Figure 4. Serial cross sections of stigma near apex, showing stylar canals and 2 small oil-glands between. × 4.2.

Figure 5. Live fruiting branch of tree. (Copied from Goossens.) ⅛ nat. size.

[17] Longley, Albert F. Polycarpy, polyspory and polyploidy in Citrus and Citrus Relatives. (Jour. Wash. Acad. Sci. 15: 347–351, 1 fig. 1925.)

Citropsis latialata (De Wild.) Swingle et M. Kellerman. Figures 6–10 from type specimen.

Figure 6. Very large leaf. ¼ nat. size.

Figure 7. Longitudinal serial sections of pistil. × 4.2.

Figure 8. Longitudinal sections of pedicel, calyx and disk detached from same pistil. × 4.2.

Figure 9. Serial cross sections of ovary (from same pistil as figures 7 and 8). × 4.2.

Figure 10. Serial cross sections of stigma showing stylar canals alternating with a single large oil-gland. × 4.2.

PLATE 3

Citropsis Tanakae Swingle et M. Kellerman. Figures 1–5 from type specimen.

Figure 1. Leafy twig with the flower bud later cut into serial microtome sections. (Photograph by Tanaka.) ½ nat. size.

Figure 2. Serial cross sections of flower bud showing origin of stamens, corolla and calyx lobe tips each with a single large oil-gland. × 10.5.

Figure 3. Cross sections of flower bud showing nectary partly enclosing base of ovary, also cohering staminal filaments and corolla. × 10.5.

Figure 4. Cross sections showing 4-locular ovary and stamens cohering in several groups. × 10.5.

Figure 5. Cross sections of flower bud showing stigma with large oil-glands surrounded by anthers, one (above) showing a single large oil-gland in the tip of the connective, the whole enclosed by petals showing many oil-glands. × 10.5.

Citropsis Daweana Swingle et M. Kellerman. Cotype.

Figure 6. Twig with spines and one 7-foliolate leaf, also several wingless petioles supporting a winged rachis segment. ½ nat. size.

PLATE 4

Atalantia racemosa var. *Henryi* Swingle. Figures 1–4 from type material.

Figure 1. Flowering branch. ½ nat. size.

Figure 2. Longitudinal section of fully mature flower. × 10.

Figure 3. Cross section of flower bud showing stigma with 4 stylar canals with 8 large oil-glands in pairs between the stylar canals; anthers show a single small oil-gland in connective, also 4-merous calyx and corolla. × 10.5.

Figure 4. Cross section of flower bud showing 4-locular ovary, stamens partially cohering, corolla and calyx lobes. × 10.

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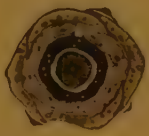

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CITROPSIS GILLETIANA Swingle & M. Kellerman

FULL-TONE — MERIDEN

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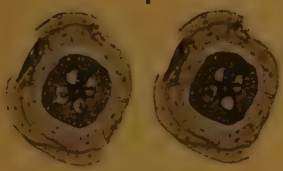

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Citropsis Gilletiana Swingle & M. Kellerman
and C. latialata (De Wildeman) Swingle & M. Kellerman

Citropsis Tanakae Swingle & M. Kellerman
and C. Daweana Swingle & M. Kellerman

ATALANTIA RACEMOSA var. HENRYI Swingle, A. RACEMOSA Wight, FORTUNELLA HINDSII var. CHINTOU Swingle and F. HINDSII (Champion) Swingle

FULL-TONE — MERIDEN

Atalantia racemosa Wight, from Bombay, for comparison.

Figure 5. Serial cross sections of flower bud showing small dense stigma and anthers with one large oil-gland in connective. × 5.6.

Fortunella Hindsii var. *Chintou* Swingle. Type specimen.

Figure 6. Fruiting branch of type tree photographed in fresh condition. ½ nat. size.

Fortunella Hindsii (Champion) Swingle.

Figure 7. Fruiting branch photographed in fresh condition showing very small fruits. ½ nat. size.

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STUDIES IN THEACEAE, V
THE THEACEAE OF NEW GUINEA*

CLARENCE E. KOBUSKI

THESE STUDIES have been possible only because of the superb collections made by L. J. Brass on his four trips to New Guinea. His first collection (October 1925 – June 1926) was made under the auspices of the Arnold Arboretum. Since that time, as a member of the Richard Archbold Expeditions to New Guinea, he has made three more collections (1933–34, 1936–37, 1938–39). The 1933–34 and 1936–37 collections were made in British New Guinea, while the 1938–39 expedition was to Netherlands New Guinea.

Supplementing this material of Mr. Brass are some specimens collected by Mrs. M. S. Clemens (1935–37) in Northeastern New Guinea and photographs and fragments of type specimens of *Eurya* from various European herbaria.

The literature dealing with New Guinean Theaceae is quite sparse and is briefly given here:

1891. F. v. Mueller in Jour. Bot. **29**: 176. 1891. Here, to my knowledge, was described the first species of Theaceae from New Guinea. The species: *Ternstroemia Britteniana* is from British New Guinea.

1901. Schumann & Lauterbach, Fl. Deutsch. Schutzgeb. Südsee, 447. 1901. In this flora of the South Sea Islands, a second species, first of the genus *Eurya* was described. The species: *Eurya Tigang*, is from Northeastern New Guinea.

1912. Lauterbach in Nova Guinea, **8**[4]: 841–842. 1912. Three species, *Ternstroemia papuana*, *Eurya Hellwigii* and *E. Roemeri* were added as a result of expeditions to Netherlands New Guinea.

1922. Diels in Bot. Jahrb. **57**: 431–435. 1922. This is the first comprehensive treatment of the family. Three new species, *Adinandra calosericea*, *Eurya leptantha* and *E. oxysepala*, besides two new varieties of *E. Tigang* (var. *meizophylla* and *phyllopoda*) were described.

1923. Baker, f. in Jour. Bot. **61**: Suppl. 4. 1923. Here, in a treatment of the H. O. Forbes plants collected in New Guinea, two new species (*Ternstroemia sogerensis* and *Adinandra Forbesii*) were added.

*Botanical Results of the Richard Archbold Expeditions.

1925. Melchior in Engler & Prantl, Nat. Pflanzenfam. ed. 2, **21**: 148. 1925. A general compilation of material to date.

1928. White in Proc. Roy. Soc. Queensland, **39**: 66, pl. 4, fig. 2. 1928. *Eurya albiflora* was described. An enumeration of the plants collected by C. E. Lane-Poole.

1929. Diels in Bot. Jahrb. **62**: 483. 1929. A single species *Eurya orcogena* is here described in an enumeration of plants collected generally by Herrn Missionar Chr. Keysser in the Sarawaket Forests, Northeastern New Guinea.

Diels in Jour. Arnold Arb. **10**: 241. 1929. Here Diels contributing to White's "Ligneous plants collected in the Territory of Papua (British New Guinea) in 1925–26 by L. J. Brass," lists *Ternstroemia megacarpa* Merrill.

1937. Kobuski in Ann. Missouri Bot. Garden, **25**: 344–351. 1937. In a general treatment of the genus *Eurya*, eleven species are enumerated of which five (*E. Greenmaniana, E. Merrilliana, E. meizophylla, E. Rehderiana* and *E. phyllopoda*) are new.

1939. Kobuski in Jour. Arnold Arb. **20**: 362. 1939. In a supplementary study of *Eurya*, the species *E. Brassii* is added.

GORDONIA Ellis

Gordonia Brassii, spec. nov.

Arbor 12 m. alta. Folia coriacea, nitida, glabra, oblongo-obovata, 6–12 cm. longa et 3.5–6 cm. lata, apice obtusa, basi cuneata, supra venis manifestis margine subintegerrime vel sparse undulato-serrata, petiolis glabris 3–7 mm. longis. Flores solitarii, axillares, albi 3–3.5 cm. diam., pedicellis ca. 4 mm. longis bracteolis cito caducis; sepala 5, inaequalia obovata imbricata, pergamenacea, extus pubescentia, margine scariosa, 4–12 mm. longa et 7–17 mm. lata; petala 5 subrotundata imbricata extus pubescentia, 20–22 mm. longa et 17–21 mm. lata, margine membranaceo 5–7 mm. lato, fimbriata, venis manifestis; stamina ca. 60–65, basi petalis adnata, filamentis ca. 9 mm. longis et 1 mm. diam., eis seriei interioris pubescentibus, basi in cupulam 3 mm. altam connatis, antheris sagittatis apice obtusis ca. 4 mm. longis et basi 2 mm. latis; ovarium dense pubescens, conicum, lobulatum, ca. 6–7 mm. longum, basi 4 mm. apice 1.5 mm. diam., 5-loculare, stylis 5 liberis 2.5–3 mm. longis. Fructus ligneus leviter pubescens dehiscens ca. 2.5–3.0 cm. longus, obovatus, apice 5-carinatus, seminibus ca. 20, ca. 2 cm. longis, alatis.

Netherlands New Guinea: Balim River, on slope of old secondary forest, alt. 1750 m., *L. J. Brass & Chr. Versteegh 11170*, December 10, 1938 (tree 12 m. high with crown not wide spreading; diam. 81 cm.; flowers white and fruit green; bark 10 mm. thick, rough, scaly, brown).

The stamens and styles seem to be the outstanding characters in this

species. A careful count reveals ± 60 stamens. In appearance the number does not seem so different from the number in *G. papuana* (120) and its varieties (140 & 160) because of the size of both anthers and filaments. The latter, 9 mm. long, are approximately 1 mm. thick near the base and taper toward the apex. The inner row is pubescent on the inner surface. The anthers are large (4 mm. long), sagittate and obtuse at the apex. The styles are free for 2.5–3.0 mm. as compared with the connate or subconnate styles of *G. papuana*. The transition from bracteoles through sepals to petals is very apparent in this species. The bracteoles are quickly caducous. The three outer sepals measure 4–5 mm. long and 7–8 mm. wide and are pergamentaceous. The two inner sepals are quite petaloid measuring 7–12 mm. long and 11–17 mm. wide. Although these are thickened at the center and base, their margins are thin, membranaceous and veined like the petals. The outer petals on the other hand, are hairy on the back and thickened like the calyx.

Previous authors have attributed the Papuan material of *Gordonia* to *G. fragrans* Merrill. Evidently these authors have had no opportunity to compare their material with true representatives of the Philippine species. In its larger flowers (5 cm. diam.) and fruit (3.0–3.5 cm. long), Merrill's species is more closely related to *G. Brassii* than to *G. papuana* and its varieties. The veining of the leaves in the Philippine species, "nerves obscure, scarcely more prominent than the lax reticulations," as Merrill stated, together with the undulate-serrate margin, the acuminate apex and the finely tapering base are distinct marks of difference. In *G. Brassii,* the prominent veins of the leaves, along with the obtuse apex and abruptly cuneate base are a few of its notable features. Even the margin, although occasionally subcrenate, bears no close resemblance to that of *G. fragrans*. The fruit of the Philippine species differs in that the diameter is larger at the base while in *G. Brassii* the greatest diameter is in the swelling near the apex.

Gordonia papuana, spec. nov.

Arbor parva fruticosa. Folia coriacea, utrinque opaca, glabra, oblongo-obovata, 7–10 cm. longa et 3.0–4.5 cm. lata, apice obtusa, basi cuneata, subintegerrima vel sparse undulato-serrata, venis supra obscuris; petiolis glabris ca. 5 mm. longis. Flores solitarii, axillares, ca. 2 cm. diam., pedicellis ca. 3–5 mm. longis pubescentibus, bracteolis parvis, obovatis ca. 3 mm. longis cito caducis; sepala 5, imbricata inaequalia concava obovata, subrotundata, pergamenacea, pubescentia 5–7 mm. longa et 7–9 mm. lata; petala 5, imbricata extus pubescentia, rotundata, 15–16 mm. longa et 15–16 mm. lata, margine membranacea; stamina ca.

160 in seriebus pluribus, basi petalis adnata, filamentis 4.5–7.0 mm. longis, basi in cupulam 3 mm. connatis, antheris 1–3 mm. longis; ovarium dense pubescens, conicum, lobulatum, ca. 5 mm. longum, stylis 5 connatis vel subconnatis ca. 3 mm. longis. Fructus parvus ligneus leviter pubescens, dehiscens ca. 1.5 cm. longus, 7–8 mm. diam. seminibus ca. 20, ca. 12 mm. longis alatis alis ca. 6 mm. longis.

NETHERLANDS NEW GUINEA: Hollandia and vicinity, forest clumps in secondary savannahs, alt. 20–100 m., *L. J. Brass 8884,* TYPE, June 29, 1938 (bushy tree 6–7 m.). — Hollandia and vicinity, primary rainforest, alt. 100 m., *L. J. Brass 8992,* July 8, 1938 (trunk cylindrical; bark hard, flaky, pale brown). — Hollandia and vicinity, open slopes of grass and fern, alt. 20–100 m., *L. J. Brass 8811,* June 14, 1938 (bushy tree 6–7 m. high).

Clearly distinguished from the former species because of larger number of stamens (160), the more or less connate styles, smaller flowers and fruit and leaves dull on both surfaces.

Described below are two varieties of this species. These varieties, in themselves are near-specific entities. However, after deliberation, it seems wiser to treat them as variations — at least until further material is available.

Gordonia papuana var. **acuminata,** var. nov.

A typo differt foliis oblongo-ellipticis, acuminatis, 9–16 cm. longis et 3.5 cm. latis; staminibus 140 plus minusve, filamentis seriei interioris pubescentibus, antheris hastatis 1.0–1.5 mm. longis.

Canopy tree 25 m., spur-buttressed stem, pubescent when very young, bark pale gray-brown. Leaves coriaceous, somewhat shiny, occasionally pubescent, generally glabrous on petiole, oblong-elliptic, 9–16 cm. long and 3–5 cm. wide, long-acuminate at the apex, tapering cuneate at the base, veins on some leaves obscure on others distinct, margin somewhat crenulate-serrate, petiole 0.7–1.0 cm. long. Flowers axillary solitary, greenish white; pedicel 8–10 mm. long, bracteoles sepaloid early caducous; sepals 6, imbricate, pergamentaceous, pubescent, somewhat concave, broadly ovate 9–11 cm. long, 9–11 cm. wide, the outer sepals 9 × 9 cm., inner sepals 11 × 11 cm.; petals 6, the two outer ones fleshy 13–14 cm. long, 13–15 cm. wide, three inner petals with broader membranaceous margin 15–18 mm. long, 15–16 mm. wide, the sixth petal intermediate between the two groups; stamens ± 140 in four or five series, adnate to base of corolla, filaments of varying length 4–6 mm. fused at base into a collar 2.5–3 mm. long, pubescent on the inner side of inner series, anthers hastate, 1.0–1.5 mm. long, ca. 2.0 mm. wide at

base, nearly truncate at base; ovary and style 6 mm. over all, densely pubescent, ovary ca. 3 mm. long, lobed at base, 5-loculate; styles 5, ca. 3 mm. long, connate for most of their length. Fruit woody, dehiscent finely pubescent, obovate, 5-ridged, 5-celled, 1.7–2.5 cm. long, ca. 1.2 cm. wide at upper part. Seeds winged, ca. 12 mm. long, wings ca. 9 mm. long.

BRITISH NEW GUINEA: Fly River, 528 Mile Camp, common canopy tree on ridges, alt. 80 m., *L. J. Brass 6694*, TYPE, May 1936 (tree 25 m., stem spur-buttressed, covered with pale gray-brown bark; flowers greenish white). — Wuroi, Oriomo River, Western Division, in light rainforest, alt. 10–20 m., *L. J. Brass 5721* (AA & N. Y. Bot. Gard.) January 20, 1934 (rather slender tree, 20–25 m., thick shining leaves; flowers white).

Characterized by acuminate leaves, pubescent on petiole and lower midrib of young leaves and young stem, otherwise glabrous, ± 140 stamens with filaments of varying length (4–6 mm.), and hastate anthers. As mentioned above, under the species, this may, when supplemented by further material, be worthy of specific rank. Although six petals and six sepals are present in the flower, little significance has been attributed to this variation. The ample description was drawn completely from *Brass 6694*, the type.

Gordonia papuana var. **montana**, var. nov.

A typo differt foliis nitidis ellipticis obtuse acuminatis, 7–10 cm. longis et 3.0–3.5 cm. latis, staminibus 120 plus minusve, antheris oblongis 2.0–3.0 mm. longis et 1.0–1.5 mm. latis.

Tree up to 27 m., glabrous except very young growth. Leaves coriaceous, shiny, occasionally pubescent on petiole and midrib of very young leaves, otherwise glabrous, elliptic, obtuse at apex, cuneate at base, 7–10 cm. long, 3.0–3.5 cm. wide, margin quite entire, petiole 5–10 mm. long. Flowers axillary, solitary, white; pedicel short 4–5 mm. long, pubescent, bracteoles early caducous; sepals 5 imbricate, unequal, pergamentaceous, pubescent spot on external surface, scarious-margined, 6–7 mm. long, 7–10 mm. wide; petals 5 imbricate, pubescent spot on external surface, slightly pubescent at base on internal surface, 15–17 mm. long, 10–14 mm. wide, scarious margin 1–2 mm. wide, easily becoming fimbriate; stamens about 120, adnate to the base of the corolla, filaments varying in length 4–9 mm., fused at base in collar about 1 mm. high, anthers oblong, 2–3 mm. long, 1.0–1.5 mm. wide; ovary and styles together 5 mm. long, densely pubescent, conical, 5 mm. diam. at base, 1.5–2.0 mm. diam. at stigma, ovary 5-lobed, 5-celled, almost star-shaped in cross section, styles 5, connate or nearly so. Fruit woody, dehiscent, finely pubescent, 2.5 cm. long, seeds winged.

NETHERLANDS NEW GUINEA: Six kilometers southwest of Bernhard Camp, on the Idenburg River, slope of ridge in primary forest, alt. 1150 m., *L. J. Brass & Chr. Versteegh 12550,* TYPE, February 20, 1939 (common tree, 27 m., diameter 50 cm.; crown not wide-spreading; bark 11 mm. thick, gray, scaly; sap-wood red, heart-wood violet; flowers white). BRITISH NEW GUINEA: Bella Vista, Central Division, in forest, alt. 1450 m., *L. J. Brass 5447* (AA & N. Y. Bot. Gard.), November 8, 1933 (medium sized tree with thick smooth leaves, white flowers and 5-angled fruit). — Lake Daviumbu, Middle Fly River, in canopy layer, rain-forest, *L. J. Brass 7616,* August 1936 (common tree with white flowers).

Characterized by elliptic, obtuse leaves, ± 120 stamens with anthers oblong, not hastate, filaments varying in length 4–9 mm., glabrous. This variety has 5 petals and 5 sepals. Whereas var. *acuminata* is confined to very low altitudes (10–80 m.), var. *montana* abounds in the somewhat higher montane regions (1150–1450 m.).

Gordonia spec.

NETHERLANDS NEW GUINEA: Two kilometers southwest of Bernhard Camp, Idenburg River, on ridge slope in primary rain-forest, alt. 900 m., *L. J. Brass & Chr. Versteegh 13169,* March 18, 1939 (tree 31 m. high, diam. 43 cm., with small crown; bark 9 mm. thick, brown, scaly; sap-wood red-brown, heart-wood violet-brown).

Although a fine specimen of *Gordonia,* no. 13169 collected by Brass and Versteegh in Netherlands New Guinea lacks sufficient characters to place it definitely under any described species. It is merely mentioned here as part of the material collected under the direction of Mr. L. J. Brass in New Guinea.

ARCHBOLDIODENDRON KOBUSKI

A critical study of herbarium material of the Papuan Theaceae has revealed a small number of specimens which possess sufficient morphological characters differing from those of other genera in the family to merit generic recognition. This new genus, *Archboldiodendron,* is named in honor of Mr. Richard Archbold, leader of three expeditions to New Guinea for the primary purpose of collecting zoological specimens.

Outstanding among the characters of this new genus are the five free styles. Rarely, six or even seven styles may be found. These styles, free to the base, are, in the fresh stage, sulcate and are topped by bilobulate stigmas. This character of free styles is found in *Eurya,* where the number is usually three, rarely (and these usually in New Guinea) five.

In the Papuan species of *Gordonia*, the styles are occasionally free to the base. In *Adinandra*, one of its nearest relatives, the styles are connate.

Another interesting character is the occurrence of ten petals in two alternate rows of five each. Occasionally nine, eight or even six petals have been found instead of the usual number of ten. When lacking, the missing petals are always from the inner row of smaller petals. This discrepancy, when occurring, is usually in *Archboldiodendron Merrillianum*. In *Arch. calosericeum*, the only variation noted was in a single case where nine regular petals were found with one rather dwarf-like petal appearing as a fragment torn in dissection.

In *Adinandra* the stamens, although numerous, are generally pentandrous. In this new genus, the stamens are arranged in a single cycle attached to each other by the filaments and adnate in turn to the corolla near the base. In the Papuan species of *Gordonia*, the stamens are more numerous (120 – 140 – 160) and are arranged in a series of several close cycles. In wood structure, Dr. I. W. Bailey, of the Arnold Arboretum, finds the new genus to be more closely related to *Adinandra*.

In both *Archboldiodendron* and *Gordonia* the ovary is quinquelocular, conical, sublobulate and covered with the same dense pubescence. Yet the ovary is multiovulate and the placentae are bifid like in *Adinandra Brassii*, described in this paper.

Although no fruit is available at present, one may assume from the general form and similarity of the ovary to that of *Gordonia* that the fruit probably will be dehiscent, rather than indehiscent as in *Adinandra*.

Archboldiodendron, gen. nov.

Arbores. Folia alterna simplicia coriacea penninervia. Flores hermaphroditi in axillis solitarii, pedicellis satis longis bibracteolatis suffulti; bracteolae duae cito caducae sepalis exterioribus simillimae et calyci arcte approximatae vel persistentes et a calyce remotae; sepala 5, inaequalia imbricata concava pergamenacea; petala 10 (8 vel 6) in seriebus duobus alternatis disposita basi connata; stamina numerosa (50–60) vulgo petalis 5-plo pluria, omnia vel tantum exteriora petalis basi adnata; antherae oblongae basifixae; ovarium 5-loculare, placenta in quoque loculo bifida multiovulata; styli 5, (vel 6–7) breves liberi. Fructus ignotus.

TYPE SPECIES: Archboldiodendron calosericeum Kobuski.

Archboldiodendron calosericeum, spec. nov.

Arbor (ad 20 m. ex collectore) ramulis junioribus nitide sericeis. Folia oblongo-lanceolata, 11–13 cm. longa et 3–4 cm. lata, apice acuminata, basi angustata, decurrentia, coriacea, striis compluribus longitudi-

nalibus notatis, supra demum glabra, subtus densissime pulcherrime micanter sericea, costa nonnihil elevata rubescente, subtus prominente, nervis sub angulo fere recto divergentibus, margine glanduloso-serratula, minute revoluta. Flores in axillis solitarii, in medio 1–1.5 mm. diam., pedicello dense sericeo 1–2 cm. longo, bracteolae duae, dense sericeae, cito caducae, sepalis exterioribus simillimae et calyci arcte approximatae: sepala 5, inaequalia, concava, subrotundata, pergamenacea, 6–7 mm. longa et ca. 6 mm. lata, extus dense sericea, intus glabra, margine scariosa; petala 10 in seriebus alternatis duobus disposita, 9–13 mm. longa et 8–11 mm. lata, basi connata, undique glabra in serie exteriore medio dorso excepto; stamina ca. 50, antheris oblongis basifixis, 4–5 mm. longis, acutis, filamentis ca. 3 mm. longis, petalis basi adnatis; styli 5 (rare 6) breves (ca. 1 mm.) liberi, stigmata bilobata; ovarium dense sericeum conicum ca. 7 mm. longum diam. basi 4–5 mm., sublobatum, quinqueloculare placenta in quoque loculo bifida. Fructus ignotus.

Netherlands New Guinea: Fifteen kilometers southwest of Bernhard camp, Idenburg River, in mossy forest at 1800 m. alt., *L. J. Brass 12310*, type, January 1939 (large tree of 20 m.; 0.5 m. diam.; leaves silky, pale pubescent underneath; flowers white).— Same locality, alt. 1800 m., *L. J. Brass & Chr. Versteegh, 11966*, January 22, 1939.

This superb tree, outstanding above all other species of Theaceae in Papua, is characterized by the deep olive-buff silky pubescence found on the leaves, flowers and young branchlets. Another salient character is the occurrence of horizontal striation on the leaves, presumably caused by the close folds of the leaves in bud and still very distinct in the mature leaves. One thinks immediately of the Melastomaceae, so striking are the striations.

In this species the pedicels are usually 1–2 cm. long with a diameter of 1.0–1.5 mm. at the middle. Two sepaloid, densely pubescent bracteoles are found immediately below the calyx. These bracteoles are quickly deciduous and can be found only on the very youngest flower buds. The pedicels of *Arch. Merrillianum*, on the other hand, are more stocky, 1 cm. long and usually about 2 mm. diameter at the middle. The two bracts in this latter species are persistent, the lower bract being found near the middle of the pedicel while the second is situated midway between the lower bract and the calyx. They measure approximately 7–10 mm. × 4 mm. and are quite acuminate at the apex.

The petals in *Arch. calosericeum* are consistently ten in number and are 9–13 mm. long. In *Arch. Merrillianum* the petals may vary from ten to eight or even six and measure 13–18 mm. in length.

The styles as mentioned before, are five and are free. In *Arch. calo-*

sericeum, the styles like most other floral characters, are consistent in number and are unequal in length, the largest measuring about 2 mm. In *Arch. Merrillianum* the styles are 5–6–7 in number with the longest measuring about 2 mm.

In the leaves of these two species, we find a distinct and interesting difference in the color of the pubescence. The unfolding leaves show the distinction best. The color in *Arch. Merrillianum* is a fine amber-brown at first, becoming darker as the leaves mature. In *Arch. calosericeum* the color of the pubescence can best be described as deep olive-buff. Here again the color darkens in the mature leaves. The midrib, more noticeable on the upper surface, is red in color in both species. However, in *Arch. calosericeum* the midrib is elevated while in *Arch. Merrillianum* the midrib is distinctly canaliculate. The veins in *Arch. calosericeum* extend from the midrib at an approximate angle of 45° while in *Arch. Merrillianum* this angle approximates nearly 90°.

In 1922, Diels (Bot. Jahrb. **57**: 433. 1922) described a new species *Adinandra calosericea* from Northeast New Guinea. In his description he said, "Foliorum petiolus sericeus, lamina coriacea, striis compluribus longitudinalis notata, supra demum glabra subtus densissime sericea splendissima . . . Flores . . . polygami vel subdioica ? . . . Petala 5–6 . . . Stamina . . . circ. 25. Styli 5 liberi extus sericeo-pilosi. Ovarium . . . placentae bifidae multiovulatae." From his description it is very clear that Diels probably had a poor specimen of *Archboldiodendron*. At first I felt certain that Diels' *Adinandra calosericea* was conspecific with my *Archboldiodendron calosericeum* as here described. Later, when more material of *Arch. Merrillianum* became available, I felt less sure of this relationship since the discrepancy in the number of petals presented the possibility that Diels might have had material of *Arch. Merrillianum*. In this latter species considerable petal variation is to be found. However, it seems likely that Diels would have mentioned the persistent bracts which are so evident.

Since international conditions are so turbulent at this time, it is quite impossible to borrow the Berlin material for examination. Hence, I am giving my type species the name *Arch. calosericeum*, regardless of the fact that the Berlin *Adinandra calosericea* may be conspecific with either species here described. It will in no way affect the validity of the two species.

In Engler & Prantl's Nat. Pflanzenfam. (ed. 2, **21**: 145. 1925), Melchior introduced under *Adinandra*, a new section ELEUTHEROSTYLA for the species *Adinandra calosericea* Diels. This sectional name would have been raised to generic status were it not for the fact that the name

Eleutherostylis has since been used by Burret, (Notizbl. Bot. Gard. Berlin, 9: 629, 1926) for a new genus in the *Tiliaceae*.

Archboldiodendron Merrillianum, spec. nov.

Arbor (?) ramulis junioribus nitide sericeis; folia oblongo-elliptica vel oblongo-oblanceolata, 13–17 cm. longa et 4–6 cm. lata, apice acuta, basi cuneata, coriacea, striis compluribus longitudinalibus notatis, supra demum glabra subtus densissime pulcherrime micanter fulvescenti-sericea costa supra impressa rubescente subtus prominente, nervis sub angulo circa 45° divergentibus, margine glanduloso-serratula minute revoluta. Flores in axillis solitarii pedicello dense sericeo ca. 1 cm. longo, diam. ad mediam ca. 2 mm.; bracteolae duae, sericeae persistentes et a calyce remotae, subtriangulares, ca. 7–10 × 4 mm., apice acuminatae; sepala 5, inaequalia, concava, pergamenacea, subrotundata, 8–11 mm. longa et 5–8 mm. lata, extus dense sericea, intus glabra, margine scariosa; petala 10 (subinde 8 vel 6) in seriebus alternatis duobus disposita, 13–18 mm. longa et 8–14 mm. lata, basi connata, utrinque glabra in serie exteriore medio dorso excepta; stamina ca. 52–57, antheris oblongis basifixis, ca. 5–6 mm. longis, apice acutis, filamentis 5–7 mm. longis basi petalis adnatis; styli 5(–7), 2–3 mm. longi, liberi, stigmata 5(–7), bilobata pulvinata ca. 1 mm. longa; ovarium dense sericeum conicum ca. 5 mm. longum, diam. basi ca. 7 mm., sublobatum, quinqueloculare, placenta in quoque loculo bifida. Fructus ignotus.

British New Guinea: Mt. Tafa, Central Division, landslip regrowths, alt. 2400 m., *L. J. Brass 4863*, type AA, also in Herb. N. Y. Bot. Gard., August 26, 1933.

It is indeed surprising to find two species of such a distinctive genus resembling each other so much in gross characters. This reference is to the pubescence and the longitudinal striations on the leaves. The unfolding leaves, as mentioned earlier, are a rich amber-brown in color. The general discussion of this species has been made in a comparison under *Arch. calosericeum*.

It is a pleasure to name this species in honor of Dr. E. D. Merrill of the Arnold Arboretum. For the past few years Dr. Merrill has concentrated part of his efforts in producing an up-to-date knowledge of the New Guinean flora of which the present contribution is only a small part.

TERNSTROEMIA Mutis ex Linn. f.

Ternstroemia Britteniana F. v. Mueller in Jour. Bot. **29**: 176. 1891.—Diels in Bot. Jahrb. **57**: 432. 1922.

Unfortunately, there is no material available to me at this time, for

study of this species described so fully by F. v. Mueller. Later, Diels (1922) cited eight more specimens collected in Northeast New Guinea. To my mind this species is most closely related to *T. habbemensis* Kobuski under the discussion of which can be found a comparison with the present species. For further consideration see F. v. Mueller, l.c. and Diels, l.c.

Ternstroemia carinata, spec. nov.

Arbor ca. 20 m. alta, ramulis glabris cinereis cicatricibus notatis. Folia oblongo-elliptica, glabra, crasse coriacea, integerrima, 7.5–13 cm. longa et 3.0–4.7 cm. lata, subtus brunneo-rubra, apice acuta, basi cuneata, petiolis glabris 1.0–1.5 cm. longis. Flores solitarii laterales, pedicellis glabris bi-angulatis, 1.5–2.0 cm. longis; bracteolae duae, deltoideae, 4.0–4.5 mm. longae et 4.0–4.5 mm. latae, calyci arcte approximatae, glabrae, glanduloso-serrulatae, in medio dorso carina crassa ca. 1 mm. alta instructae, ca. 0.75 mm. longe apiculatae; sepala 5, inaequalia, glabra, imbricata, pergamenacea, obtusa, apice rotundata, ca. 7 mm. longa et 6–7 mm. lata, margine scariosa; petala 5, alba membranacea, inaequalia, ca. 10 mm. longa et 6–7 mm. lata, basi connata; stamina ca. 70, basi petalis adnata, antheris inaequalibus 1.0–2 mm. longis, filamentis inaequalibus 1.0–2.5 mm. longis; ovarium conicum, glabrum, ca. 4 mm. longum, basi 4 mm. diam., apice 2 mm. diam., bi-loculare, ovulis pluribus, stylo sessili, stigmatibus duobus planis pulvinatis bi-lobis, ca. 1.2 mm. latis. Fructus ovoideus, ca. 1.2 cm. longus, ca. 1.2 cm. diam. seminibus 3 (vel plus?), cochleariformibus rubro-maculatis, ca. 7 mm. longis et 5 mm. latis.

NETHERLANDS NEW GUINEA: Eighteen kilometers southwest of Bernhard Camp, Idenburg River, secondary forest, on ridge, alt. 2200 m., *L. J. Brass & Chr. Versteegh 12000,* Feb. 3, 1939 (rare tree 19 m. high; diam. 33 cm.; flowers white; fruit dark red; bark 10 mm. thick, brown, fairly rough; wood red-yellow).

This species receives its name from the heavy keel extending the length of the bracteole and projecting at the apex into an apicule nearly 0.75 mm. long. The keel is sometimes nearly 1 mm. high. The stigmas are flat, projecting horizontally from sessile styles. The fruit is not more than one cm. long. These characters separate it from *T. Merrilliana* which it resembles in gross structure.

Ternstroemia spec. aff. **carinata.**

BRITISH NEW GUINEA: Mt. Tafa, Central Division, ridge crest forest, alt. 2400 m., *L. J. Brass 4952,* (AA, NY), Sept. 1, 1933 (small tree; leaves dull, obscurely nerved; flowers white).

Only staminate flowers were present in the rather poor specimen which matches no other species. Its nearest relative seems to be *T. carinata* from Netherlands New Guinea. A brief description of the material at hand follows: Leaves coriaceous, glabrous, entire, 6.0–7.5 cm. long and 2.0–3.5 cm. wide, obtuse at apex, cuneate at base with a petiole 3–4 mm. long. Staminate flowers solitary, lateral, white; pedicel 2 angled, ca. 1.3 mm. long; bracteoles 2, terminating the angles of the pedicel just below sepals, somewhat keeled, apiculate, deltoid, 2–4 mm. long, 2 mm. wide; sepals 5, unequal, glabrous imbricate pergamentaceous obtuse, rounded at apex, ca. 5 mm. long, 4.5–6.0 mm. wide, scariously margined; petals 5 obovate, quite rounded at apex, 7–8.5 mm. long, 5–7 mm. wide, adnate at base; stamens 27–30, with varying lengths and points of adnation, filaments 1.0–2.5 mm. long, anthers 2–3 mm. long; pistillode quite vestigial.

Ternstroemia habbemensis, spec. nov.

Frutex 1.5 m. altus; folia elliptico-obovata vel obovata, glabra, brunneo-rubescentia, coriacea, 3.5–5 cm. longa et 1–2 cm. lata, apice obtusa vel subrotundata, basi cuneata, subrevoluta, petiolis ca. 4 mm. longis. Flores solitarii; pedicelli ca. 9–10 mm. longi, glabri, bracteolis duobus deltoideis ca. 1.0–1.5 mm. longis calyci arcte approximatis; sepala 5, inaequalia, imbricata, glabra, obtuso-flabelliforma, 3–5 mm. longa et 3–6 mm. lata, pergamenacea, concava, margine scariosa; petala 5, sepaloidea glabra ca. 5 mm. longa et 3.5 mm. lata, pergamenacea, concava, margine scariosa; stamina ± 16, glabra, antheris 1 mm. longis, filamentis 2 mm. longis petalis adnatis; ovarium conicum, glabrum, 3 mm. longum et 2 mm. latum, biloculare; stigmata pulvinata sessilia crassa medio depressa margine reflexa. Fructus ovoideus glaber, ruber 2 cm. longus et ca. 1.5 cm. diam.; semina 3–4, obliqua, ca. 10 mm. longa et 7 mm. lata, arcte compressa.

Netherlands New Guinea: Nine kilometers northeast of Lake Habbema, 2800 Meter Camp, mossy forest, on shrubby edge of landslip, alt. 2800 m., *L. J. Brass 11030,* October 1938 (shrub 1.5 m. high with red fruit).

This species is characterized by its reddish elliptic-obovate leaves, its short-pedicellate flowers and the pulvinate, sessile stigma. Its closest relative, *T. Britteniana* F. v. M., differs in its longer (3.5–6.0 cm.) ovate-lanceolate leaves, longer pedicels (1.5–2.5 cm.), stamens 20–25, its "stout, rather short" style. From *T. papuana* Lauterbach it can be separated by its 3–4-seeded fruit and its pulvinate 2-lobed sessile stigma. In Lauterbach's species the stigma is 3-lobed and the fruit, according to the author, is 2-seeded.

Ternstroemia meiocarpa, spec. nov.

Arbor magna. Folia glabra, coriacea, elliptica, integerrima, concava (ex collectore), 7–10 cm. longa et 2.5 cm. lata, apice acuminata, basi cuneata, petiolis 1.0–1.5 cm. longis. Flores ignoti. Fructus globosus, ca. 5–6 mm. longus et 6 mm. latus, bi-locularis, pedicello glabro 6–8 mm. longo; sepala 5, glabra, inaequalia, subrotundata, pergamenacea, ca. 3 mm. longa et 2.0–3.0 mm. lata; bracteolae 2, deltoideae, glabrae, ca. 1.5 mm. longae et 1.0 mm. latae, margine glandulosae; semina 2, anomala, ca. 4 mm. longa et 4 mm. lata.

NETHERLANDS NEW GUINEA: Six kilometers southwest of Bernhard Camp, Idenburg River, rain-forest, alt. 1200 m., *L. J. Brass 12762,* February 1939 (large canopy tree; leaves concave).

The outstanding feature of this species is its small fruit, occasionally found with the broken style attached. In this respect it resembles *Eurya.* However, the fruit is 2-seeded which separates it from *Eurya* as well as most species of *Ternstroemia* especially those from New Guinea. Unfortunately, there are no flowers present. Still, I do not hesitate to describe it as new since the features mentioned above are so outstandingly distinct.

Ternstroemia Merrilliana, spec. nov.

Arbor 15–20 m. alta, ramulis robustis glabris. Folia coriacea, elliptica vel oblongo-obovata, glabra, subintegerrima acuminata, cuneata, supra rubra, subtus brunnea, 15–21 cm. longa et 4–8 cm. lata, venis utrinsecus 15, petiolis glabris ca. 2 cm. longis. Flores dioeci, 2–8 in axillis foliorum, pedicellis scabris glabris 1.5–2.0 cm. longis et 3–4 mm. crassis, bracteolis 2 parvis calyci approximatis flabelliformibus; flores ♀ (Brass 13168): sepala 5, imbricata, inaequalia glabra, concava, subrotundata obtusa, 9–10 mm. longa lataque, margine scariosa; petala 5 rosea, crassa, subconcava imbricata apice rotundata, 17–20 mm. longa et ca. 15 mm. lata, margine scariosa; ovarium subrotundatum subrubrum glabrum, ca. 6 × 6 mm., bi-loculare, basi staminodiis parvis numerosis ca. 1 mm. longis circumcinctum; styli 2, liberi, ovario arctissime incumbentes, dichotome partiti, parte styli integra 1–2 mm. longa, sub apice flabellatim expansa, stigmatibus crispule papillosis coronata, stylus totus, stigmate incluso, 6–7 mm. longus. Fructus ovoideus, aurantiacus, 4.5–5.0 cm. longus, seminibus ca. 2 cm. longis roseis rubro-maculatis, sepalis in fructu ad 5 mm. incrassatis, lignescentibus coalescentibusque; flores ♂ (Brass 13289): sepala 5, imbricata, inaequalia, concava, crassa, glabra, scariosa, obtusa vel subrotundata, exterioribus tribus ca. 7 × 7 mm., interioribus duobus 7–8 mm. longis et ca. 13 mm. latis; petala 5, imbri-

cata concava, crassa, subrotundata, scariosa, 21–24 mm. longa et 20–25 mm. lata; stamina ± 160 in seriebus 5 vel 6, filamentis 1 mm. longis basi connatis, antheris ca. 7 mm. longis et 1.5 mm. latis; pistillodium conicum, glabrum, basi ± 3 mm. diam., 3 mm. longum, stylis 5–6 liberis inaequalibus, 0.5–3.0 mm. longis.

Netherlands New Guinea: Four kilometers southwest of Bernhard Camp, Idenburg River, common in wet lands of rain-forest, river plains at 850 m. alt., *L. J. Brass & Chr. Versteegh 13168,* type, ♀, March 17, 1939 (tree with small crown, 20 m. high; diameter 39 cm.; bark 20 mm. thick, dark brown, fairly rough; wood red-brown; flowers rose; fruits dark orange).— Same locality, *L. J. Brass 13681,* ♀.— Bernhard Camp on the Idenburg River, on ridge, alt. 550 m., *L. J. Brass & Chr. Versteegh 13574,* ♀, April 16, 1939 (rare tree of primary rain-forest, 21 m. high, 64 cm. diam., bark brown, 18 mm. thick; wood red; flowers rose).— Four kilometers southwest of Bernhard Camp, Idenburg River, common subsidiary tree in Agathis forest, alt. 900 m.; *L. J. Brass 13289,* ♂, March 1939 (tree up to 30 m. high, 30 cm. diameter; leaves fleshy convex; flowers cream colored). British New Guinea: Bisiatabu, foothill forest, alt. 450 m., *L. J. Brass 627,* ♀, November 13, 1925 (tree 12 m.; bark rather rough, peeling in small flakes, inner bark stains brown; leaves reddish; fruit orange colored). Northeastern New Guinea: Morobe District, alt. 750 m., *Clemens 1242,* ♂, December 11, 1935.

This species usually has been interpreted as belonging to *Ternstroemia megacarpa* Merrill. Both have fruit and leaves which are exceptionally large for the genus and are very similar in this respect. However, in *T. megacarpa* the fruiting calyx, though coriaceous, is of the same texture as the flowering calyx and not adnate to the base of the fruit. In *T. Merrilliana* the fruiting calyx has grown to a thickness of nearly 5 mm., the calyx lobes appear adnate, as a heavy disk attached to the base of the fruit and can be separated from the fruit only by cutting. The pedicels of the Philippine material are from 4–10 cm. long and the surface, although wrinkled when dried, is not scurfy. In *T. Merrilliana* the pedicels in both the staminate and pistillate flowers are only 1.5–2.0 cm. long and the entire surface is scurfy.

Unfortunately, as is evident from his description, Dr. Merrill had no pistillate flowers and poor staminate flowers. In this species are found characters, especially in the pistillate flower, which are very striking. My reference is to the style and stigma.

The styles are 2, free and lie horizontal on the ovary for 1–2 mm. at which point they branch dichotomously with the ultimate branches swell-

ing fan-like, edged with a crisp stigmatic surface at the terminus. The entire spread of an individual style and stigma is 6–7 mm.

Both this species and *T. Rehderiana* possess horizontal styles. However, in *T. Rehderiana* the styles are unbranched and shortly swell fan-like. At the edge of this structure is found the stigmatic surface.

In *T. Merrilliana,* the staminodia (♀ flower) are many and form a collar-like ring (1 mm. high) around the base of the ovary. These staminodia have not coalesced their entire distance and can be "teased out" or separated with dissecting instruments. On the other hand, in *T. Rehderiana* the staminodia equally as many in number as in *T. Merrilliana,* have coalesced completely and cannot be separated into their individual parts.

These two species are probably the outstanding species of *Ternstroemia* in Papua. There is a great resemblance between the two, yet they are too different ever to be confused. With this in mind, I find pleasure in naming them for Professors Merrill and Rehder, two outstanding botanists at the Arnold Arboretum, both of whom have helped considerably in the preparation of this paper.

Ternstroemia papuana Lauterbach in Nova Guinea, 8^4: 841. 1812.—Diels in Bot. Jahrb. **57**: 432. 1922.

NETHERLANDS NEW GUINEA: Eight kilometers southwest of Bernhard Camp, Idenburg River, mossy forest, alt. 1600 m., *L. J. Brass 12741,* February 1939 (canopy tree 20 m. high; leaves concave; flowers cream colored).

In his description of this species, Lauterbach refers to it as a shrub, stating also that the stigma is three-lobed and the fruit two-seeded. According to the collector, L. J. Brass, the specimen cited above is a canopy tree 20 m. high. The stigma is distinctly two-lobed and the mature entire fruit examined is three-seeded. Otherwise the specimen agrees sufficiently with *T. papuana.* Since I have not seen the type of *T. papuana,* I place the specimen here with reservation.

Ternstroemia Rehderiana, spec. nov.

Arbor ca. 25 m. alta, ramulis glabris. Folia oblongo-obovata, asymmetrica, coriacea, glabra, integerrima, apice obtuse acuminata, basi cuneata, 8–13 cm. longa et 3–5 cm. lata, petiolis 1.0–1.5 cm. longis. Flores solitarii, odorati, eburnei, laterales, pedicellis glabris 2.0–2.5 cm. longis; bracteolae 2, non visae, cito caducae; sepala 5, inaequalia, imbricata, glabra, concava, pergamenacea, 3.5–4.0 mm. longa et 3.5–4.0 mm.

lata, apice rotundata, margine scariosa; petala 5, obovata rotundata, 9–10 mm. longa et 6–8 mm. lata, basi connata; staminodia in coronam conspicuam crassam margine digitato-fimbriatam firme connata; ovarium glabrum, compresso-globulare, ca. 2.0–2.5 mm. longum et 4 mm. diam., biloculare; styli 2, horizontaliter patentes, quisque e duobus ramis connatis compositus, 0.5 mm. longus, stigmate uno flabelliformi 2.0 mm. longo margine digitato-fimbriato coronatus. Fructus ovatus, luteus vel aurantius, 2.5–4.5 cm. longus et 2.2–3.5 cm. latus, seminibus 4, carneis ca. 13 mm. longis et 7 mm. latis.

British New Guinea: Palmer River, two miles below the Black River Junction, sub-canopy layer in ridge forest, alt. 100 m., *L. J. Brass 7182,* type, July 1936 (slender tree attaining 25 m. height; flowers cream colored, fragrant; fruit soft yellow, ovate 4.5 cm. long × 3.5 cm. diameter).— Lake Daviumbu, Middle Fly River, Western Division, rain-forest substage, *L. J. Brass 7752,* September 1936 (bark hard, brown, suberose, exfoliating in small scales; fruit orange colored, smooth, ovate, ± 2.8 cm. long × 2.5 cm. diameter; seeds pink).— Same locality, *L. J. Brass 7456,* August 1936 (bark brown, hard, slightly fissured; fruit orange colored, ± 2.5 cm. long × 2.2–2.3 cm. diameter).

Outstanding features of this species are the horizontal styles and the solid corona formed by the fused staminodes. Most closely allied is *T. Merrilliana,* also of New Guinea. Both are large fruited with woody calyces firmly adnate to the fruit. Also they both possess the unusual and conspicuous horizontal styles with flabelliform stigmas. In *T. Merrilliana* the styles are dichotomously branched, the staminodes form a similar corona of staminodes which are merely joined at the filaments and can be separated in dissection, the leaves are 15–21 cm. long with approximately 15 pairs of veins and the pedicels are always distinctly scurfy. In this species the styles are unbranched, the individual staminodes are fused together their entire length presenting a solid corona with minute fringe-like processes on the top, similar to but smaller than those found on the stigma. The leaves are 8–13 cm. long with only 5–6 pairs of veins. The pedicels are smooth. In all features of the flower the measurements are considerably smaller in this species than in those of *T. Merrilliana.* The petals are fleshy and concave.

It is a pleasure to name this distinctive species in honor of Professor Alfred Rehder, Curator of the herbarium at the Arnold Arboretum. Although more of a specialist in the Chinese flora, his interest in the Theaceae of New Guinea has been most helpful in the preparation of this paper.

Ternstroemia sogerensis Baker f. in Jour. Bot. **61**: Suppl. 4. 1923.

No material was available for the study of this species, the description of which is rather meager in itself. Evidently no pistillate flowers or fruit were available to the author. The only measurements given are those of the leaves. For description and discussion of this species see Baker f., l.c.

Ternstroemia sphondylophora, spec. nov.

Frutex vel arbor parva ca. 2–3 m. alta, ramulis glabris verticillatis angulatis. Folia obovato-spathulata, verticillata, glabra, rubra, coriacea, 1.0–2.7 cm. longa et 0.5–1.2 cm. lata, apice rotundata, emarginata, basi cuneata in petiolum 1–2 mm. longum decurrentia. Flores dioeci, pauci; pedicelli ca. 3 mm. longi glabri, bracteolis duobus deltoideis sepaloideis apiculatis, nonnihil puberulentis, ca. 1.5 mm. longis latisque; sepala 5 imbricata, inaequalia, obtusa, rotundata, concava, pergamenacea, nonnihil puberulenta, 2–3 mm. longa et 3–4 mm. lata, margine scariosa; petala 5, subcrassa obtusa, ca. 4 mm. longa et 3 mm. lata, basi connata; ♂ flores: stamina ± 20, glabra, antheris 2 mm. longis, filamentis 1.0–1.5 mm. longis basi petalis adnatis, pistillodio parvo inconspicuo; ♀ flores: ovarium oblongum ca. 3 mm. longum et 1 mm. latum, biloculare, stylo sessili, stigmatibus duobus planis reniformis, basi staminodiis vel staminibus circumcinctum. Fructus ovoideus, glaber, ruber, crassus ca. 1.5–2.0 cm. longus et 1.5 cm. latus, seminibus ca. 6, luteis, funiculo ad 5 mm. longo.

A very distinct species characterized by its verticillate angled branchlets and verticillate spathulate leaves which, for the genus, are quite small measuring in the ♀ plants only 1–2 cm. long and in the ♂ plants 1.5–2.7 cm. long. The flowers, inconspicuous in both plants, are quite rare, found only occasionally and then singly on the terminal branchlets. At first, they appear as if they might belong to *Eurya*. However, closer examination shows the sessile style and reniform stigma. Also the fruits possess fewer and larger seeds than any species of *Eurya*.

NETHERLANDS NEW GUINEA: Eighteen kilometers southwest of Bernhard Camp, Idenburg River, mossy forest, abundant in low scrub on exposed peak, alt. 2150 m., *L. J. Brass 12448,* TYPE ♂, February 1939 (tree or shrub 2–3 m. high; flowers white).— Same locality, *L. J. Brass 12449* ♀, February 1939 (fruit red, fleshy).

ADINANDRA JACK

Adinandra Brassii, spec. nov.

Arbor alta, ramulis glabris cinereis, cortice lamellosa (ex collectore), gemmis puberulentis. Folia glabra vel glabrescentia, coriacea, obo-

vata, 4–7 cm. longa et 2.5–4 cm. lata, apice subrotundata subemarginataque, basi cuneata, margine subrevoluta glandulis inconspicuis paucis, petiolis glabris 5–7 mm. longis. Flores in axillis foliorum solitarii, pedicellis glabris ca. 3 cm. longis basi 2 mm. et apice 4 mm. diam.; bracteolae duae, puberulae, coriaceae suboppositae flabelliformes, calycem proximae sepala exteriora simulantes, ca. 1.5 mm. longae et 2.5 mm. latae; sepala 5, inaequalia imbricata, concava, pergamenacea, pubescentia, obtusa, 5–6 mm. longa et 5–6 mm. lata, (5 × 6 mm. vel 6 × 5 mm.); petala 5, purpurea, subcrassa, subtiliter pubescentia, 15–20 mm. longa et 14–16 mm. lata, margine scariosa; stamina pentadelpha 55–60, filamentis 6–11 mm. longis, dorso dense hirsuta, antheris basifixis ca. 3–4 mm. longis; ovarium globoso-conicum, glabrum, 6 mm. longum et 7 mm. latum in stylum gracile elongatum gradatim attenuatum, 5-loculare, placentis prominentibus bifidis recurvis interdum ab axi subsecedentibus multiovulata; stylus integerrimus. Fructus globosus, ruber, ca. 2.7 cm. longus et 3.0 cm. latus.

British New Guinea: Lake Daviumbu, Middle Fly River, rain-forest, *L. J. Brass 7856,* type, September 1936 (very large tree with thick scaly bark; flowers purple).— Wuroi, Oriomo River, Western Division, riverine rain-forest, alt. 5–10 m., *L. J. Brass 5874,* February 2, 1934 (large, heavy boled, spreading tree with flaky-scaly brown bark and tough brown wood; leaf apex down-turned and margin much recurved near base; flowers purple, pendent beneath leaves) (AA & N. Y. Bot. Gard.). Netherlands New Guinea: Two kilometers southwest of Bernhard Camp, Idenburg River, frequent on slopes of primary rain-forest, alt. 850 m., *L. J. Brass & Chr. Versteegh 13176,* March 19, 1939 (tree 29 m. high; diameter 43 cm.; crown not wide-spreading; bark 13 mm. thick, black scaly, fairly rough; sap-wood red-brown, heart-wood violet).— Six kilometers southwest of Bernhard Camp, Idenburg River, frequent tree of primary forest, on slope of ridge, alt. 1200 m., *L. J. Brass & Chr. Versteegh 12519,* Feb. 15, 1939, (tree 28 m. high, diameter 55 cm., crown not wide-spreading; bark 8 mm. thick, brown, fairly smooth; sap-wood light brown, heart-wood violet; flowers dark red; fruit green when young, red when mature).

A distinctive species characterized by thick, scaly bark, pubescent stamens, which are quite hirsute on the dorsal surface and upper portion of ventral surface. The basal portion of the filaments on the ventral surface is glabrous. The leaves are obovate. The only other known *Adinandra* from Papua, *A. Forbesii* Baker f., differs from the present species by having ovate-oblong leaves and glabrous stamens. I have not had the opportunity to examine Baker's species.

Variation can be found among the other specimens cited. In Brass 5874 and 13176 the leaves are more subrotund and larger (9 cm. × 5 cm.). Of No. 5874, Brass states "one of the largest forest trees in the district attaining a trunk diameter of ± 1 meter." Attached to specimen No. 13176 is an immature green fruit. This fruit is globose, ca. 1.8 cm. long and 2.0 cm. wide. Although there are no flowers present on the specimen, I feel that it belongs to *A. Brassii* because attached near the base of the immature fruit are found fragments of pubescent anthers, characteristic of the flowers of this species.

In his field notes, Brass refers to the bark of No. 12519 as "fairly smooth" from which it may be inferred that the bark is somewhat rough. Otherwise it agrees with the type specimen.

Adinandra Forbesii Baker f. in Jour. Bot. **61**: Suppl. 4. 1923.

This is the only species of *Adinandra* recorded before from New Guinea. No material is available for study at present and the species is listed here merely to complete the records of New Guinean Theaceae. For a discussion, see the comparison under *A. Brassii* Kobuski, above and the original description. Baker in his reference to *A. holosericea* Diels undoubtedly means *A. calosericea* Diels which, in this paper, is treated under the new genus, *Archboldiodendron.*

EURYA THUNBERG

Eurya albiflora White in Proc. Roy. Soc. Queensland **39**: 66, pl. 4, fig. 2. 1928.— Kobuski in Ann. Missouri Bot. Garden **25**: 346. 1937.

Eurya oreogena Diels in Bot. Jahrb. **62**: 483. 1929.

NORTHEAST NEW GUINEA: Morobe District, Sarawaket, *M. S. Clemens 6093,* March 1937.

I was indeed pleased to find this species represented among the Clemens' collection. Formerly,[1] I found it necessary to list and discuss the species without material, dependent entirely on White's very fine and detailed description. The leaves are coriaceous, deeply veined and glabrous on the upper surface. Below they are covered with a dense, grayish tomentose pubescence. This pubescence is found also on the young branchlets, especially near the terminals. For these reasons, as well as the cordate base of the leaf, it can easily be separated from its closest relative, *E. Brassii.*

Eurya Brassii Kobuski in Jour. Arnold Arb. **20**: 362. 1939.

BRITISH NEW GUINEA: Central Division, Wharton Range, Murray

[1]Kobuski in Ann. Missouri Bot. Garden **25**: 346. 1937.

Pass, grassland ridge crests, alt. 2840 m., *L. J. Brass 4185* ♀ TYPE, June 12, 1933 (common prostrate or ascending shrub, often rooting from branches; corolla white; fruit dark blue).— Central Division, Mt. Albert Edward, in low thickets on summits of low ridges on grasslands, alt. 3680 m., *L. J. Brass 4499* ♂, July 11, 1933 (common, low dense-foliaged shrub with white flowers). NETHERLANDS NEW GUINEA: Lake Habbema, 3225 Meter Camp, plentiful in low shrubberies on open grassland, alt. 3225 m., *L. J. Brass 9189* ♂, August 1938 (low shrub with thick stiff leaves and small cream-colored flowers).— Mt. Wilhelmina, 11 kilometers northeast of Wilhelmina-top in rather dry open place on edge of subalpine forest, alt. 3400 m. *L. J. Brass & E. Myer-Drees 9685* ♂, September 9, 1938 (very small shrub; corolla white, soon turning brown).

Characterized by its small (1–2 cm. long), coriaceous leaves with nerves deeply impressed on the upper surface. In this respect, it resembles its var. *erecta* and *E. albiflora*. The variety is discussed below. *Eurya albiflora* differs in having the branchlets and under-surface of the leaves covered with a dense pubescence of long brown hairs. In *E. Brassii* the branchlets, except for the very young growth, are quite glabrous and the leaves are always glabrous.

Also closely related is *E. Hellwigii* Lauterbach. In Lauterbach's species the leaves are usually 3 cm. or over in length and about 2 cm. wide and possess up to nine pairs of veins. The habit is that of a tree (3–5 m.). In *E. Brassii*, the leaves are not only distinctly smaller but rarely have more than five or six pairs of veins.

Eurya Brassii var. **erecta**, var. nov.

A typo differt habito erecto, ramulis glabris alatis albidis, foliis magis cuneatis atrovirentibus.

NETHERLANDS NEW GUINEA: Seven kilometers northeast of Mt. Wilhelmina summit, plentiful in subalpine forest borders, alt. 3560 m., *L. J. Brass & E. Myer-Drees 9909*, ♀, TYPE, September 1938 (tree or shrub 5 m.; fruit ovoid).— Same locality, on edge of forest, *L. J. Brass & E. Myer-Drees 9906*, ♀, September 1938 (tree or tall shrub; fruit globose).— Two kilometers east of Mt. Wilhelmina summit, common on creviced faces of sandstone, alt. 3800 m., *L. J. Brass & E. Myer-Drees 10124*, ♀, September 1938 (shrub one m. high).— Same locality, subalpine forest, alt. 3800 m., *L. J. Brass & E. Myer-Drees 10330*, ♀, September 21, 1938 (shrub ± 2.5 m. high; ripe fruits black, glossy).

"Trees or tall shrubs" is the description of the habit of this variety, as stated by the two collectors. The branchlets in all four numbers cited

above, are very erect and close and appear fastigiate, although the collectors do not mention this feature. Also, these branchlets, whose surface is white and glossy, are distinctly winged, sometimes continuously so. This winged feature is found in most glabrous specimens of the genus, yet is not as pronounced as in this variety. The leaves are a much deeper green in color and decidedly more cuneate than those of the species.

In the species the collectors mentioned the habit as prostrate or as a small ascending shrub often rooting from the branches. The branchlets appear spreading, hardly fastigiate and although grayish in color, lack the whitish surface of this variety. The leaves may be decurrent, thus giving an angled appearance to the stem which, however, is not as noticeable a character as the winged stems of the variety.

Eurya Dielsiana, spec. nov.

Frutex erectus, 2 m. altus, ramulis teretibus pubescentibus. Folia subcoriacea, glabra, gemmis puberulentis, oblongo-elliptica, 2.5–3.5 cm. longa et 0.8–1.5 cm. lata, apice acuminata, basi cuneata, serrata, petiolis 2–3 mm. longis. Flores axillares, 1–2, pedicellis ± 2.5 mm. longis curvatis; bracteolae minutae, ± 0.5 mm. longae, obtusae; sepala 5, obtusa, inaequalia, imbricata, ± 1.25 mm. longa; petala 5, imbricata, inaequalia, apice obtusa ± 2.5 mm. longa et 1.5 mm. lata; stamina (flos ♂) 5, filamentis crassis ± 1.5 mm. longis, antheris ± 0.75 mm. longis, pistillodio conico quam 1 mm. breviore; ovarium (flos ♀) globosum glabrum, ± 1 mm. longum; styli 3 liberi brevissimi, recurvi. Fructus immaturus ut videtur, glaber, ± 3 mm. longus et 2–2.5 mm. latus tri-locularis.

NETHERLANDS NEW GUINEA: Balim River, common in sparse second growth on deforested slopes, alt. 1600 m., *L. J. Brass 11646,* December 1938 (erect shrub 2 m. high; flowers white; fruit purple).

This erect shrub with its small (2.5–3.5 cm. long) oblong-elliptic leaves resembles no New Guinean species of *Eurya* closely. The stems are terete and the young branchlets and leaves are puberulent. The flowers are quite small for the genus, in fact, not more than 2–3 mm. long over all. Likewise, the styles (three in number) are very minute, measuring hardly more than 0.25 mm.

It is a pleasure to name this species after Professor L. Diels of the Berlin Botanical Garden and Museum. Professor Diels, in 1922, published the last comprehensive study of Theaceae in New Giunea.

Eurya gracilipes, spec. nov.

Arbor gracilis vel frutex ad 3 m. altus, ramulis foliisque juvenilibus

pubescentibus. Folia submembranacea opaca glabra oblongo-lanceolata, 6.0–8.5 cm. longa et 1.5–2.0 cm. lata, apice tenuiter acuminata, basi asymmetrica, cuneata, serrata, petiolis 3–5 mm. longis. Flores ♀ axillares 1–3, pedicellis ca. 2–3 mm. longis sparse hirsutis; bracteolae inaequales, apiculatae sparse hirsutae, ± 1 mm. longae; sepala 5, inaequalia, imbricata, obtusa, apiculata, ca. 1.5 mm. longa, exteriora sparse hirsuta; petala 5, inaequalia, imbricata, alba, oblongo-ovata vel oblongo-obovata, ca. 2 mm. longa et 1 mm. lata; ovarium globosum, glabrum, ca. 1.25 mm. diametro, stylis 3 brevissimis. Fructus immaturus, ca. 4 mm. longus et 3 mm. latus, pedicello gracili 5–6 mm. longo.

Netherlands New Guinea: Fifteen kilometers southwest of Bernhard Camp, Idenburg River, common in seral mossy forest, alt. 1700 m., *L. J. Brass 12323*, ♀ type, January 1939 (very slender tree, 3 m. high with white flowers.— Same locality, alt. 1800 m., *L. J. Brass 12260*, January 1939 (slender shrub or near tree 1.5–3 m., high with white flowers and black fleshy fruit).

Characterized by slender-acuminate and asymmetrically cuneate leaves. The styles are three in number and very short. This last character is the most significant in separating the species from *E. leptantha* Diels which according to the author is five-styled. Also, Diels' species is a tree to 10 m. high and has leaves which are dark green in color and measure 4.5–5.0 cm. long and 1.0–1.5 cm. wide. *Eurya gracilipes* is a slender tree or shrub growing to 3 m. only and has leaves 6.0–8.0 cm. long and 1.5–2.0 cm. wide. Perhaps the character most striking to the eye, is the slender graceful pedicels (5–6 mm. long) found in the fruiting specimens. It is from this character that the name has been derived.

Eurya Greenmaniana Kobuski in Ann. Missouri Bot. Garden, **25**: 344. 1937.

Northeast New Guinea: Murray Pass, Wharton Range, Central Division, common at fringes and interior of forests, alt. 2840 m., *L. J. Brass 4744* (type AA, also in N. Y. Bot. Gard.), June–September 1933.

For a discussion of this species see Kobuski, l.c.

Eurya Groffii Merrill in Philip. Jour. Sci. **25**: 247. 1919.— Melchior in Engler & Prantl, Nat. Pflanzenfam. ed. 2, **21**: 148. 1925.

Eurya acuminata De Candolle var. *multiflora* sensu Rehder & Wilson in Sargent, Pl. Wilson. **2**: 401. 1915, non Blume.

Eurya acuminata De Candolle var. *Groffii* (Merrill) Kobuski in Ann. Missouri Bot. Gard. **25**: 325. 1937.

Netherlands New Guinea: Six kilometers southwest of Bernhard

Camp, Idenburg River, rain-forest subsidiary tree, alt. 1200 m., *L. J. Brass 12970,* February 1939 (tree 16 m. high, 20 cm. diam.; leaves stiff; flowers white).

Merrill's species *E. Groffii,* has been reinstated here as a species. In 1937, after considerable vacillation, I made it a variety of *E. acuminata* DC. At that time, I mentioned my uncertainty as to its status. Until now, *E. Groffii* has been confined to the states of China overlapping in western China with *E. acuminata.* It was with surprise that I noted it among the sheets of Papuan material for study.

It may be characterized by its dense pubescence on the younger branches and leaves, its terete stems, leaves long-acuminate at the apex and cuneate into the sessile base or very short petiole.

Cited here dubiously are two numbers also from Netherlands New Guinea, — *L. J. Brass 12291* and *L. J. Brass & Chr. Versteegh 11961.* These two numbers are from pistillate plants and resemble the Chinese members of the species very closely. The young stems are angled by the decurrent leaves losing the terete character of true *E. Groffii* and are more nearly glabrous than pubescent.

Eurya habbemensis, spec. nov.

Arbor 3–4 m. alta; ramulis teretibus glabris, ramulis foliisque juvenilibus pubescentibus. Folia coriacea, opaca, glabra, atrovirentia, ovata vel elliptica, 10–15 cm. longa et 5.5–7.0 cm. lata, apice obtusa, basi obtuse cuneata vel subrotundata, serrata, venis subtus prominentibus, petiolis 5–8 mm. longis. Flores ignoti. Fructus axillares 1, 2 vel 3, rotundati vel globosi, glabri 5–6 mm. longi latique, 5-loculares, pedicello 3–4 mm. longo; bracteolae inaequales deltoideae vel obtusae, ca. 3 mm. longae; sepala 5, submembranacea, inaequalia, obtusa subinde apiculata, glabra, 5–6 mm. longa lataque; styli 5 liberi 1.0–1.5 mm. longi.

Netherlands New Guinea: Nine kilometers northeast of Lake Habbema, 2800 Meter Camp, occasional in forest of moist hollows, alt. 2800 m., *L. J. Brass 10503,* October 1938 (undergrowth tree 3–4 m. high; fruit immature).

Like so many species of *Eurya* from New Guinea, the above species is characterized by having five free styles. However, the broad ovate or elliptic, dull, light green leaves, obtusely cuneate or subrotund at the base are the most outstanding characters. Seven cm. across is a most unusual foliar measurement in this genus. Even though flowers are not available and the fruits are immature, this species is one of the most outstanding, at least superficially, of the whole genus.

Eurya Hellwigii Lauterbach in Nova Guinea, 8^4: 841. 1912.— Kobuski in Ann. Missouri Bot. Garden, **25**: 345. 1937.

NETHERLANDS NEW GUINEA: summit of Hellwig Mts., alt. 2500 m., *L. von Roemer 1249* (TYPE; photo, AA), Nov. 1909. BRITISH NEW GUINEA: Mt. Albert Edward, Central Division, common on forest fringes, alt. 3680 m., *L. J. Brass 4264,* May–July, 1933 (tree 3–5 m., with stiff spreading branches; branchlets reddish; leaves yellowish beneath; flowers white).

For a discussion of this species see Kobuski, l.c.

Eurya idenburgiensis, spec. nov.

Arbor 6 m. alta, glabra, ramulis juvenilibus angulatis exceptis. Folia membranacea glabra, juvenilibus exceptis, oblongo-lanceolata, 6–10 cm. longa et 1.5–2.5 cm. lata, graciliter acuminata, basi cuneata vel subrotundata, serrata, venis obscuris, petiolis glabris ± 3 mm. longis. Flores ♀ axillares, 1–2, albi, pedicellis glabris recurvatis 2–3 mm. longis; bracteolae duae, suboppositae, glabrae, obtusae abrupte apiculatae, ± 0.5 mm. longae; sepala 5, imbricata glabra inaequalia concava, obtusa, ± 1.0 mm. longa et 0.75 mm. lata, ciliata vel fimbriata; petala 5, imbricata inaequalia, obtusa, ± 2 mm. longa et ± 1 mm. lata; ovarium globosum, glabrum, ± 1 mm. longum, quinqueloculare, multiovulatum. Fructus immaturus.

NETHERLANDS NEW GUINEA: Four kilometers southwest of Bernhard Camp, Idenburg River, on open high banks of rain-forest stream, alt. 850 m., *L. J. Brass 13427,* March 1939 (tree 6 m. high with white flowers).

In leaf shape, this species resembles the acuminate species of China (i.e. *acuminata, Groffii, trichocarpa*). However, it can easily be separated from these by its 5-celled ovary, 5 styles, glabrous and angled stems. The bracteoles are very short (± 0.5 mm.) and sharply apiculate.

Eurya leptantha Diels in Bot. Jahrb. **57**: 433. 1922.— Kobuski in Ann. Missouri Bot. Garden, **25**: 349. 1937.

NORTHEAST NEW GUINEA: Schraderberg, Sepik Terr., mountain forest, alt. 2070 m., *C. Ledermann 12201* (TYPE; photo. & fragment, AA) (tree 8–10 m., with dark brown bark; leaves shiny, dark green, gray-green beneath; flowers white).

For a discussion of this species see Diels, l.c., and Kobuski, l.c.

Eurya meizophylla (Diels) Kobuski in Ann. Missouri Bot. Garden, **25**: 348, 1937.

Eurya tigang Schumann & Lauterbach var. *meizophylla* Diels in Bot. Jahrb. **57**: 434. 1922.

NORTHEAST NEW GUINEA: Lordberg, wooded mountains, alt. 1000 m., *C. Ledermann 9981* (TYPE; photo. and fragment, AA) (slender tree 15–20 m., with brown bark, white flowers and dark green leaves).

For a discussion of this species, see Kobuski, l.c.

Eurya Merrilliana Kobuski in Ann. Missouri Bot. Garden, **25**: 347. 1937.

NORTHEAST NEW GUINEA: Morobe District, Sarawaket, *M. S. Clemens 5914*, March 1937. BRITISH NEW GUINEA: Murray Pass, Wharton Range, *L. J. Brass 4660* TYPE, and *4575*.

Added here is Clemens' specimen no. 5914. This specimen is from a much older plant than the two Brass numbers 4660 and 4575 and is rather poor. The leaves seem more coriaceous but have the characteristic veining perpendicular to the midrib.

Eurya oxysepala Diels in Bot. Jahrb. **57**: 435. 1922.— Kobuski in Ann. Missouri Bot. Garden, **25**: 350. 1937.

NORTHEAST NEW GUINEA: Schraderberg, Sepik Terr. mountain forest, alt. 2070 m., *C. Ledermann 11971* (TYPE; photo. and fragment, AA), June 13, 1913 (tree 15–20 m.; flowers white; leaves shiny dark green with bright red petioles, young leaves yellowish red; bark gray-brown).

For a discussion of this species see Diels, l.c., and Kobuski, l.c.

Eurya Perryana, spec. nov.

Arbor diffuse ramosa ca. 4 m. alta, ramulis junioribus villosis. Folia subcoriacea, ovata vel elliptica, 1.5–2.25 cm. longa et 0.9–1.1 cm. lata, apice obtusa, basi obtusa vel subtruncata, supra nitide atrovirescentia, glabra, subtus subnitida flavovirescentia, villosa, serrata, subsessilia, petiolis ca. 1 mm. longis. Flores ♀, 1 vel 2, axillares, pedicellis 1.5–2.0 mm. longis; bracteolae lineares, ca. 2 mm. longae, apiculatae; sepala 5, sublinearia, glabra, subpetaloidea, apiculata, 1.5–2.25 mm. longa; petala 5, oblonga, 2.0–2.25 mm. longa et 1.0–1.5 mm. lata, acuminata; ovarium globosum, glabrum ca. 1 mm. diam., 3-loculare, multi-ovulatum; styli 3, liberi, ca. 0.5 mm. longi recurvati. Fructus immaturus glaber, globosus, 2 mm. longus ca. 3 mm. diam.

NETHERLANDS NEW GUINEA: Nine kilometers northeast of Lake Habbema, shaded banks of forest stream, alt. 2800 m., *L. J. Brass 10248A*, TYPE, October 1938 (straggling tree, 4 m. high; flowers cream-colored).— Same locality, alt. 2900 m., *L. J. Brass 10848*, October 1938 (tree 2 m. high; flowers white).

Because of its small, semi-coriaceous, subsessile leaves, *E. Perryana*

is outstanding among the Papuan species of *Eurya*. Also the flower, because of its small, almost minute, acuminate petals and sepals is very significant.

Superficially, it resembles most those small-leaved endemic Formosan species, *E. leptophylla* Hayata and *E. crenatifolia* (Yamamoto) Kobuski.

It is a pleasure to name this distinctive species in honor of Dr. Lily M. Perry of the Arnold Arboretum. In conjunction with Dr. E. D. Merrill, Dr. Perry is preparing the "Plantae Papuanae Archboldianae."

Eurya phyllopoda (Diels) Kobuski in Ann. Missouri Bot. Garden, **25**: 350. 1937.

Eurya tigang Schumann & Lauterbach var. *meizophylla* Diels in Bot. Jahrb. **57**: 435. 1922.

NORTHEAST NEW GUINEA: Sepik Terr., rocky peak, forest, alt. 1400–1500 m., *C. Ledermann 12752* (TYPE; photo. and fragment, AA), August 19, 1913 (tree 10–12 m. with greenish white flowers and blue-black fruit; leaves bright shining green, almost white [fide collector] underneath).

For a discussion of this species see Kobuski, l.c.

Eurya pluriflora, spec. nov.

Arbor gracilis 3 m. alta, ramulis brunneo-griseis angulatis glabris. Folia coriacea, glabra, oblongo-ovata vel oblongo-elliptica, 5.0–8.5 cm. longa et 2.5–3.5 cm. lata, acuminata, emarginata, basi cuneata, serrata venis undique elevatis, petiolis glabris 2–4 mm. longis. Flores parvi, albi, 1–6 in axillis foliorum, pedicellis 2–3 mm. longis; sepala 5, imbricata glabra, concava, inaequalia, basi connata, obovata ± 1 mm. longa, apice subrotundata, bracteolis 2 glabris apiculatis ± 0.5 mm. longis subtenta; petala 5, imbricata, inaequalia, obovata basi connata, apice subrotundata, ± 2 mm. longa et 1.25 mm. lata; ovarium globosum, glabrum, ± 1 mm. longum; styli 3 vel 4 vel 5, liberi vel subconnati, ± 0.5 mm. longi. Fructus immaturus.

NETHERLANDS NEW GUINEA: Balim River, forest undergrowth, alt. 1600 m., *L. J. Brass 11705*, December 1938 (slender tree 3 m. high; flowers white; fruit immature).

This species is closely related to *E. Merrilliana* from which it can be separated by its variable number of styles 3–4 occasionally 5, its angled branches and glabrous leaves and branchlets and its much smaller flowers. *Eurya Merrilliana*, as far as is known, consistently has five styles, the branches are terete, the leaves and branchlets are sparingly pubescent in the adult stage and quite hirsute in the young growth. In leaf-character

one finds a great resemblance between the two species. The veining in *E. Merrilliana* is nearly perpendicular whereas in *E. pluriflora*, the veins arise at an obtuse angle. One cannot help feeling that *E. pluriflora* may possibly be a hybrid with *E. Merrilliana* one of the parents.

The number of flowers found in the leaf axils is most interesting. In the majority of species, one, two or even three is the usual number. In this species the number varies from one to, in many cases, six. The specific name "pluriflora" is based upon this character.

Eurya Rehderiana Kobuski in Ann. Missouri Bot. Garden, **25**: 349. 1937.

BRITISH NEW GUINEA: Mt. Tafa, Central Division, common in forests on lower slopes, alt. 2400 m., *L. J. Brass 5073* (TYPE AA, also in N. Y. Bot. Gard.) May–September 1933.

For a discussion of this species see Kobuski, l.c.

Eurya Roemeri Lauterbach in Nova Guinea, **8**[1]: 842. 1912.— Kobuski in Ann. Missouri Bot. Garden, **25**: 344. 1937.

NETHERLANDS NEW GUINEA: lowlands of Hellwig Mts., alt. 750 m., *L. von Roemer 848*, (TYPE: photo. and fragment, AA), November 1909.

For a discussion of this species see Kobuski, l.c.

Eurya subrotunda, spec. nov.

Frutex ramis pendentibus ad 1 m., ramulis junioribus pubescentibus. Folia subrotundata, nitida atrovirescentia, glabra, 2–3 cm. longa et 1–2 cm. lata, apice obtusa vel subrotundata, basi obtusa vel subrotundata, margine revoluta et crenulato-serrata, venis supra profunde impressis subtus elevatis rubris, petiolis 3–5 mm. longis. Flores ♀ in axillis solitarii, albi subsessiles, pedicellis 1.0–1.5 mm. longis; bracteolae 2, oblongo-obtusae, apiculatae, 0.8–0.9 mm. longae, glanduloso-fimbriatae; sepala 5, inaequalia, glabra imbricata, ca. 1.5 mm. longa, apiculata vel retusa, glanduloso-fimbriata; petala 5–6, oblongo-obtusa, inaequalia imbricata, basi connata, petalo exteriore apiculato, interioribus retusis, ca. 3 mm. longa et 1.0–1.5 mm. lata; ovarium glabrum subglobosum trisulcatum, ca. 1.25 mm. diam., tri-loculare, multiovulatum; styli 3 liberi, minimi recurvi ca. 0.25 mm. longi. Fructus niger, globosus ca. 4 mm. diam.

NETHERLANDS NEW GUINEA: Eleven kilometers northeast of Mt. Wilhelmina summit, on perpendicular banks of stream in forest, alt. 3400 m., *L. J. Brass & E. Myer-Drees 9808*, September 1938 (pendent to 1 m. or more; flowers white; fruit black, fleshy).

The small bracteoles (0.8–0.9 mm.) with their button-like apicules

and glandular fimbriate margins and the sepals similar to the bracteoles in margin and apex, are outstanding characteristics of this species. The petals are also unequal and are characterized by having the outer petal apiculate while the other 4 or 5 as the case may be, are retuse at the apex. The veins present a most interesting character. Those of the upper surface of the leaf are deeply imbedded like those of several other species of *Eurya;* however, the veins of the lower surface, dark red in color, open and with few cross-veins, the two lower pairs often starting from the base of the leaf, simulate very much the wing-pattern of some insects.

A closely related species is *E. Hellwigii* Lauterbach from Northeast and British New Guinea. The latter species has larger leaves, similar in veining with the veins nearly perpendicular to the midrib and very reticulate. The floral parts are all much larger and are uniform in shape.

Eurya Tigang Schumann & Lauterbach, Fl. Deutsch. Schutzgeb. Südsee, 447. 1901.— Diels in Engler, Bot. Jahrb. **57:** 434. 1922.— Kobuski in Ann. Missouri Bot. Garden, **25:** 347. 1937.

Northeast New Guinea: Morobe District: Sattelberg, *Bamber 24* (type; photo. and fragment, AA), December 24, 1898.— Same locality *M. S. Clemens 1280,* December 20, 1935.— Ogeramnang, alt. 1725 m., *M. S. Clemens 4556,* December 8, 1936.— Same locality, alt. 1800 m., *M. S. Clemens 5399,* February 15, 1937. Netherlands New Guinea: Bele River, eighteen kilometers northeast of Lake Habbema, in second growth forest, alt. 2350 m., *L. J. Brass 11454, 11560A,* November 1938 (slender tree 4–5 m. high; flowers white).

This species is characterized by oblong, linear-lanceolate leaves, 4–12 cm. long, 1.5–3.2 cm. wide, acuminate at the apex, rounded to cuneate at the base, short petiolate (2–3 mm.) or subsessile, the young leaves and branchlets covered with a rust-colored pubescence.

Measurements made from the ♂ flowers of the Brass material show bracteoles 2.5 mm. long, acute at apex; sepals unequal ca. 4.5 mm. long, 2.5 cm. wide, obtuse at apex; petals ca. 6 mm. long, 3+ mm. wide; stamens 4.5 m. long, anthers ca. 2 mm. long, filaments ca. 2.5 mm. long, pistillode ca. 3 mm. long, 1 mm. wide, long acuminate. These measurements add to the range in size of the ♂ flowers. Another interesting feature is that the sepals are pubescent on the inner as well as the outer surface.

Eurya spec.

Netherlands New Guinea: Eighteen kilometers southwest of Bernhard Camp, Idenburg River, plentiful on an open rock slide in

mossy forest, alt. 2150 m., *L. J. Brass 12456,* February 1939 (very slender "tree" 2 m. high; fruit blue-black).

This specimen collected by Brass (12456) in Netherlands New Guinea probably represents a new species. However, the material is insufficient to permit a complete and accurate description. No flowering material, either staminate or pistillate, is available and the fruits appear immature. The leaves are 3.5–4.5 cm. long and 1.0–1.7 cm. wide, ovate, coriaceous, nearly linear-acuminate at the apex, cuneate to rounded at the base, pubescent on the under surface and the margin sharply serrate. The fruiting styles may be 3, 4 or 5 in number and this variation is found in nearly equal distribution in the material examined. In gross structure it lacks individual character, resembling any number of species, yet wholly agreeing with none.

HERBARIUM, ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

PLANTAE PAPUANAE ARCHBOLDIANAE, II*

E. D. Merrill and L. M. Perry

With one plate

Since the publication of our first paper in this series, the choice and ample collections of the third Richard Archbold Expedition (Indisch-Amerikaansche Expeditie) have been arranged for study. Unfortunately, owing to the present war situation, we are unable to distribute the families set apart for study by specialists abroad. In continuing our work of identifying the miscellany, we must, of necessity, leave many points in doubt, to be settled later by comparison with the types and diverse collections showing something of the variation and limits of species.

PANDANACEAE

Freycinetia Gaudichaud

Freycinetia angustissima Ridley, Jour. Bot. **24**: 359. 1886; Martelli, Webbia **3**: 309. 1910.

Freycinetia stenophylla Warburg in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee Nachtr. 53. 1905; Martelli, Webbia **3**: 315. 1910, Jour. Arnold Arb. **10**: 137. 1929; White, Jour. Arnold Arb. **10**: 201. 1929; Merr. & Perry, Jour. Arnold Arb. **20**: 141. 1939.

Freycinetia polyclada Merr. & Perry, Jour. Arnold Arb. **20**: 141. 1939.

British New Guinea: *Brass 4961* (type of *F. polyclada*), *5300, 6720, 6929, 7124.* Netherlands New Guinea: Hollandia, *Brass 8828, 8874,* alt. 50 m., common in rain-forest undergrowth; 4 km. southwest of Bernhard Camp, Idenburg River, *Brass 13642,* alt. 850 m., abundant in the rain-forest of the river flood-plains (climbing shrub with slender radiating branches, ascending to 6–7 m.).

The photograph of the type of *Freycinetia angustissima* Ridley, received through the courtesy of Dr. J. Ramsbottom of the British Museum, shows the infructescence of this species in various stages of development. We are convinced that our *F. polyclada* is identical with this and must be reduced to synonymy. Mr. L. J. Brass who collected

*Botanical Results of the Richard Archbold Expeditions. See Jour. Arnold Arb. **20**: 324–345. 1939 for part one.

the type-material suggested that the very short leaves as well as the compact and appressed habit of the plant are the result of growth in an exposed place. Although we have no authentic material of Warburg's *F. stenophylla* for comparison, the description is so clear-cut as to convince us that Martelli was right in reducing it to *F. angustissima* Ridl. The leaves vary greatly in length but the infructescence appears to be constant in its characters.

We might also add that the specimen, *Lane-Poole 410,* distributed as this species, certainly does not belong to the entity under discussion. We have not sufficient similar material by which to identify it.

Freycinetia linearis sp. nov. § *Oligostigma.*

Frutex scandens; ramulis ± 4 mm. crassis; internodiis 3–9 mm. longis; foliis confertis, subcoriaceis, erecto-ascendentibus, anguste linearibus, sursum attenuato-acuminatis, 25–35 cm. longis, ± 4 mm. latis, margine integris vel in parte apicali obsolete denticulatis; auriculis 2–4 cm. longis, 4 mm. latis, membranaceo-scariosis, cito a folio solutis; inflorescentiis terminalibus; spathis caducis; spadicibus foemineis 3 vel 4, pedicellis ± 1 cm. longis, praecipue in parte superiore scabris; syncarpiis immaturis oblongis, 1–3 cm. longis, 0.5–1 cm. latis; baccis immaturis, praeter apicem succulentis, in parte apicali liberis, breviter truncato-pyramidatis; stigmatibus 1–3, ± confluentibus, annulo prominulo cinctis; staminodiis brevissimis; seminibus immaturis; rhaphe rhaphidophora; strophiolo nullo.

NETHERLANDS NEW GUINEA: 12 km. northeast of Lake Habbema, *Brass 11049* (TYPE), November 1938, alt. 2600 m., covering the dead stump of a tree in a forest clearing; Bele River, 18 km. northeast of Lake Habbema, *Brass 11462,* November 1938, alt. 2200 m., massed on trees in forest edges; common but seldom fertile.

From the description, most like *Freycinetia Naumannii* Warb. of the Bismarck Archipelago, but differing in the longer leaves and the rough peduncles of the syncarps. Among Papuan species, superficially suggesting *F. linearifolia* Merr. & Perry, but with almost terete rather than 3-angled branchlets, practically smooth leaves and auricles, scabrous peduncles and only 1–3 stigmas.

Freycinetia fibrosa Martelli, Jour. Arnold Arb. **10:** 138. 1929.

The material, *Brass 3908, 5178,* cited in our first article on New Guinean Pandanaceae* as *Freycinetia sogerensis* Rendle, is really *F. fibrosa* Martelli. A photograph of the type of *F. sogerensis* Rendle,

*Jour. Arnold Arb. 20: 147. 1939.

received sometime after the publication of our paper, clearly shows this to be one of the species with axillary or lateral inflorescences, while *F. fibrosa* Martelli has terminal ones.

Freycinetia trachypoda sp. nov. § *Oligostigma.*

Frutex scandens ad 15 m.; ramulis ± 6 mm. crassis; internodiis circiter 1 cm. longis; foliis superioribus ad apicem ramorum confertis, coriaceis, anguste linearibus, basi amplexicaulibus, sursum attenuato-acuminatis, 60–80 cm. longis, 1.5 cm. latis, praecipue basim versus tessellatis, margine minute remotiuscule dentato-serratis, interdum in parte media laevibus; costa media in parte superiore minute remotiuscule spinulosa; auriculis membranaceis, 6–8 cm. longis, circiter 7 mm. latis; inflorescentiis foemineis terminalibus, spathis caducis; spadicibus 3, pedicellis circiter 4 cm. longis, 5 mm. latis, hispidulis, pilis crassis rigidis rectis vel curvatis, confertis, circiter 1 mm. longis; syncarpiis immaturis oblongo-cylindricis, 6–6.5 cm. longis, circiter 1.8 cm. latis; baccis prismaticis, immaturis 6 mm. longis; stigmatibus 2–3 annulo angusto cinctis.

Netherlands New Guinea: Hollandia, *Brass 8997* (type), *11847*, July 1938, alt. 50 m., common in old secondary rain-forest (scrambling to 15 m.; leaves somewhat glaucous below; fruit unripe).

The habit of this species is very similar to that of *Freycinetia Klossii* Ridley, but the leaves and the syncarps are longer in proportion to their width, the peduncles are hispidulous and the stigmas 2–3.

Freycinetia gladiifolia Martelli, Webbia **3:** 185, 311. 1910.

Netherlands New Guinea: Hollandia, *Brass 8994, 8995, 9004*, alt. 50 m., common in the rain-forest; eastern slopes of the Cyclops Mountains, *Brass 8941*, alt. 430 m., climbing to 20 m. in tall forest. Bracts orange-red or orange.

This species was based by Martelli on staminate material from Geelvink Bay. Unfortunately, we have only the original description for comparison, and the staminate inflorescence offers so little variation in characters that we hesitate to identify any material on such a basis, yet the species must be considered. In the above collections the leaves vary from 45 to 60 cm. long just below the inflorescence, a little farther down the stem they are 80 cm. long and about 0.7–1 cm. broad. Both ♂ and ♀ inflorescences are represented but none of the ♀ spadices are mature. The peduncles are smooth, the largest spadix (♀) is oblong, 6.5 cm. long, 1.3 cm. diameter, the berries are ± prismatic with 2–4 stigmas.

Freycinetia lateriflora Ridley, Trans. Linn. Soc. II. Bot. **9:** 236. 1916.

Netherlands New Guinea: 6 km. southwest of Bernhard Camp,

Idenburg River, *Brass 12745, 12798, 13022,* alt. 1500 m., 1200 m. and 1300 m. respectively, scrambling to 2–3 m. in the mossy-forest and the rain-forest (bracts green; fruit-heads orange, borne on old wood); 15 km. southwest of Bernhard Camp, Idenburg River, *Brass 11875,* mossy-forest at 1800 m. alt., very characteristic abundant low climber massed about the lower parts of tree trunks (seldom fertile); 18 km. southwest of Bernhard Camp, Idenburg River, *Brass 12690,* mossy-forest, at 2150 m. alt., common in gullies but not seen on ridges.

A photograph of the numbers cited in the original description of *Freycinetia lateriflora* Ridley is at hand. The leaves vary from 12 to 25 cm. long and are 4–5 mm. broad. No well developed syncarps appear, although Ridley's description indicates two globose heads 4 mm. long; the berry is characterized thus, "Fructus fere 2 mm. longi, pulposi, oblongi, rubri."

In the collections cited above there is considerable variation and perhaps all do not represent this entity. *Brass 11875, 12690, 13022* are unquestionably alike, with short leafy branches arising from a main branch with relatively long internodes (1–2 cm.), and leaves 15–35 cm. long, 2–3 mm. broad, narrowed at the apex into a long slender tip inconspicuously serrate-denticulate. These specimens have fruitheads in all stages of development from the immature syncarp 3 mm. in diameter to the mature subglobose one 1.2 cm. diameter (berries with 2–3 stigmas). The other two numbers are possibly only the tips of branches or the apex of the main shoot with leaves clustered at the apex and the inflorescence below them. In *Brass 12745,* the leaves are 35–45 cm. long, 5–7 mm. broad, narrowed at the apex into a very long (5–7 cm.) acuminate, almost subulate tip obviously serrate-denticulate or spinulose, the stem is robust (7 mm. diameter) with short internodes (4–6 mm. long), and the fruitheads are very young (5 mm. diameter), the berries mostly have 3 stigmas. *Brass 12798* appears to be somewhat dwarfed, the branch (± 4 mm. diameter) is very closely scarred or covered with small protruding knobs which are probably the bases of old inflorescences. Only one small axillary ♂ inflorescence (larger spathes ± triangular, about 7 mm. long and broad, the one spadix with a smooth peduncle about 4 mm. long, and the stamen-bearing part 3 mm. long, broadly ellipsoid or subglobose) appears amongst the leaves (12 mm. long, 3 mm. broad, smooth).

Freycinetia erythrospatha sp. nov. § *Pleiostigma.*

Caulis in parte superiore foliaceus, circiter 6 mm. crassus; internodiis 0.5–1 cm. longis; foliis confertis, imbricatis, late linearibus, ad apicem

sursum attenuato-acuminatis, subcoriaceis, 20–30 cm. longis, 4–6 mm. latis, margine supra basim per spatium breve serrato-denticulatis, sursum in parte apicali et subtus in costa media obsolete serrulatis; auriculis ± 2.5 cm. longis, cito in fibras solutis; inflorescentiis lateralibus (infra foliis) vel axillaribus, fere sessilibus; bracteis multis a basi sensim auctis, deciduis, saepius margine sub apice minute spinuliferis, inferioribus 5 mm. longis, triangularibus, obtuse acutis, superioribus 2–2.5 cm. longis, ovatis, rubris; spadicibus masculis 3 vel 4; pedicellis tenuibus, ± 1 cm. longis, circiter 1 mm. latis, laevibus; parte staminifera ± 8 mm. longa, cylindracea; filamentis 1 mm. longis, antheris parvis, oblongis; spadicibus foemineis 3 vel 4; pedicellis 1–2 cm. longis, versus basim interdum spinulosis; syncarpiis (immaturis) oblongis, circiter 1 cm. longis, 5 mm. diametro; baccis (immaturis) 1.5 mm. longis, columnaribus, stigmatibus 4–6.

Netherlands New Guinea: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass 12018, 12143, 12242* (type), *12432*, January 1939, alt. 1800 m., mossy-forest, in open situations; 18 km. southwest of Bernhard Camp, Idenburg River, *Brass 12635, 12636*, February 1939, alt. 2150 m., mossy-forest, plentiful in open situations. Scrambling to 2–4 m.; bracts red.

Although the leaves of *Freycinetia Gibbseae* Rendle are about the same size as those of this species, the latter may be readily distinguished by the almost sessile inflorescence (common peduncle 0.5–1 cm. long), and the smaller and less showy spathe-like bracts.

Freycinetia sterrophylla sp. nov. § *Pleiostigma*.

Scandens; ramis 8(–17) mm. crassis, foliatis; internodiis ± 7–10 mm. longis; foliis 30–40 cm. longis, 1–1.5 cm. latis, coriaceis, valide imbricatis, ascendentibus, apice acutis vel acuminatis, margine spinuliferis; auriculis membranaceis, circiter 5 cm. longis, cito in fibras solutis; costa media supra impressa, subtus prominula, apicem versus remotiuscule denticulato-spinulifera; inflorescentiis axillaribus vel lateralibus, raro terminalibus; pedunculo communi (vel ramulo brevissimo) bracteato; bracteis multis, imbricatis, rubris, deciduis late lanceolatis, apice in acumen trigonum desinentibus, margine minute spinuliferis, imis ± 2 cm. longis, sursum gradatim increscentibus, inferioribus ± 4 cm. longis, superioribus subito majoribus ac spathiformibus, late ovatis, 4.5–5 cm. latis, 6–7 cm. longis, acuminatis (acumine 0.7–1.5 cm. longis), margine sub apice spinulosis; spadicibus 3–4, immaturis oblongo-ellipsoideis, 0.7–2 cm. longis, 0.5–1 cm. latis, maturis subglobosis, ± 3.5 cm. diametro (interdum ellipsoideis ± 5 cm. longis); pedicellis 2.5–3 cm. longis,

hispidis (pilis rigidis, rectis vel curvatis confertis, circiter 0.5 mm. longis); baccis oblongis, ± 1 cm. longis, in apice liberis, sublignosis, anguloso-pyramidatis, truncatis; stigmatibus (3–)4–6 annulo angusto cinctis; seminibus fere 3 mm. longis, rhaphe lata rhaphidophora praeditis.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass 10697* (TYPE), October 1938, alt. 2750 m., occasional in forests of the slopes (ascending to 20–25 m.; bracts red); Bele River, 18 km. northeast of Lake Habbema, *Brass 11279, 11280, 11567,* November 1938, alt. 2300 m., in tall primary forest, common.

The habit of *Freycinetia Gibbseae* Rendle strongly suggests that of this species, but the latter is a much coarser plant with larger leaves, auricles tending to disappear instead of persisting in shreds, and rather long-acuminate bracts on the inflorescence.

Freycinetia pleurantha sp. nov. § *Pleiostigma.*

Rami 2–2.5 cm. crassi; foliis coriaceis, basim versus paullo angustatis, in parte superiore sensim attenuato-acuminatis, 70–75 cm. longis, 3.5 cm. latis, margine per spatium breve supra auriculis remotiuscule dentatis, in parte media laevibus, ad apicem inconspicue denticulatis; costa media in parte superiore subtus remote spinulosa; auriculis 15–17 cm. longis, cito solutis; inflorescentiis foemineis in ramulis brevissimis axillaribus terminalibus, vel axillaribus in apice pedunculi communis; ramulis bracteis triangulari-navicularibus acutis 3 cm. longis latisque margine sub apice denticulatis (vel spinuliferis) seriebus 3 dense imbricatis indutis; ramulo vel pedunculo communi (in specimine typico) 7.5 cm. longo; spadicibus 4, pedicellis 4–5 cm. longis, praecipue in parte superiore valide hispidis; syncarpiis immaturis cylindraceis ± 13 cm. longis, ± 2.5 cm. latis; baccis immaturis ± 1 cm. longis, prismaticis, in parte superiore coriaceis; vertice plano, annulo cincto; stigmatibus 6–8(–12).

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass 13096* (TYPE), March 1939, alt. 900 m., ascending to the middle spaces in the mossy forest (lower side of leaves very glaucous; inflorescence axillary; unripe fruit a pale glaucous green).

Freycinetia Lauterbachii Warburg (including *F. papuana* Warb. fide Martelli, Webbia **3:** 313 footnote [2]. 1910), *F. funicularis* (Savigny) Merr., *F. rhodospatha* Ridley and *F. pleurantha* form a group of very closely related species, the limits of which are very difficult to determine without further material. At present, *F. pleurantha* appears to be distinct by the proportionately (as compared with the width) greater length of the leaves, their coarser texture, the very long auricles and the

strongly hispid peduncles of the syncarps. Unfortunately, the drupes are very immature and the seeds have not yet developed.

Pandanus Linnaeus

Pandanus paludosus Merr. & Perry, Jour. Arnold Arb. **20:** 172. 1939.

Though much chagrined, we are very grateful to Professor Kanehira for calling our attention to a discrepancy in the original description of this species. He pointed out that if the diameter of the syncarp is 7–8 cm., the drupes could not possibly be 6 cm. long. As a matter of fact the drupes are 3 cm. long (not 6 cm.). The error probably crept in from checking the description with the plate which was sketched on a ×2 linear diameter, but in printing was reduced to natural size.

Pandanus dolichopodus sp. nov. § *Keura.* Plate I, figs. 19–21.

Arbor radicibus aëreis 2 m. longis suffulta; trunco 16 m. longo apice ramoso; foliis 2.8 m. longis, circiter 8 cm. latis, basi vix dilatatis, chartaceis, sensim acutis, basim versus tessellatis; plicis lateralibus inermibus; costa media acuta basim versus laevi, sursum consperse serrato-denticulata; margine ± remotiuscule denticulato-serrato; inflorescentiis terminalibus, paniculatis; infructescentiis pendulis; pedunculo 3.3 m. longo; syncarpiis 5, anguste oblongis (in specimine typico ± 17 cm. longis, ± 7 cm. latis); phalangibus (immaturis?) numerosis, 3.5 cm. longis, ± 1.5 cm. latis crassisque, supra planis; loculis 7–11, parvis, apice breviter convexis, sulcis angustiusculis non profundis separatis; stigmatibus ad verticem loculorum planis hippocrepiformibus; endocarpio osseo, in dimidia parte inferiore phalangis locato; mesocarpio supero cavernoso.

Netherlands New Guinea: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass 13439* (type), March 1939, alt. 850 m., one example in poorly drained rain-forest (stem 16 m. long, branched into an open crown and supported on spreading stilt-roots 2 m. in length; a measured leaf 2.86 m. long; inflorescence terminal, paniculate; infructescence pendent on a long (3.3 m.) peduncle; fruit-heads 5, glaucous green).

Although resembling *Pandanus scabribracteatus* Mart. in the racemose inflorescence, this species may be distinguished by the more gradually acuminate leaves with smooth plicae, and the narrowly oblong syncarps.

Pandanus penicillus Mart. Bull. Soc. Bot. Ital. **1904:** 299, 300. 1904, Webbia **4:** 27, *t. 14, f. 2.* 1913. Plate I, fig. 18.

Netherlands New Guinea: Bernhard Camp, Idenburg River,

Brass 13827, April 1939, alt. 55 m., rain-forest, common on moist alluvial soil (large species ± 15 m. high, with long spreading stilt-roots and twice branched crown; leaves ± 2 m. long, the lower surface glaucous at the base; fruit-heads terminal, subglobose, glaucous green); 6 km. southwest of Bernhard Camp, Idenburg River, *Brass 12874*, February 1939, alt. 1200 m., occasional in rain-forest of the slopes (13 m. tall; prop-roots 5–6 m. long; stem branched, rather thick, the upper part a smooth shining brown; leaves 250–260 cm. long; fruit-heads terminal, solitary, globose (in specimen 30 cm. long, 29 cm. diameter); upper end of the drupes glaucous green, the lower red).

These two collections seem to represent a single species, one (*Brass 13827*) with immature phalanges, the other (*Brass 12874*) with mature ones. The immature ones correspond closely to the original 3-line description and the later figure of a phalange of *Pandanus penicillus* Mart. This species was described from phalanges collected by D'Albertis in the Fly River region (Netherlands New Guinea fide Mart. in Webbia, l.c.) but has not since been recorded so far as we know. The leaves of the specimens at hand are very much like those of *P. hystrix* Mart. The mature phalanges are ± 12 cm. long and 3–4 cm. broad, with the endocarp located in the lower half; the mesocarp is more fibrous than medullose.

Pandanus brachyphyllus sp. nov. § *Hombronia*. PLATE I, FIGS. 1–4.

Arbor ad 25 m. alta, ramosa, radicibus aëreis numerosis 4–5 m. longis suffulta; foliis ± 1.5 m. longis, 8–9.5 cm. latis, basi vix dilatatis, apicem versus sensim attenuatis, apice proprio longe acuminatis, basim versus tessellatis; margine remotiuscule serrato-dentato, dentibus brevibus, basim versus patulo-ascendentibus; plicis lateralibus laevibus vel apicem versus consperse dentatis; costa media acuta sursum remotiuscule serrato-dentata, basim versus remote recurvato-dentata; syncarpio terminali foliis ± occultato, 37 cm. longo, 17.5 cm. lato; drupis (phalangibus) numerosissimis, ± clavatis, 4–5 cm. longis, 9–13 mm. latis, 6–7(–10) mm. crassis, plerumque compressis, in parte libera (± 1 cm. longa) angulosis, in vertice saepe transverse sulcatis, plerumque 2–3 (1–4) discis polygonalibus planis terminatis, stigmatibus (1–4) margine discorum lateraliter dispositis; loculis 1–4, monoseriatis vel biseriatis; endocarpio osseo, ± 1.5 cm. longo, basim versus drupae sito; mesocarpio supero fibroso (paululo medulloso).

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass 12255* (TYPE), January 1939, alt. 1800 m., mossy-forest, common in sheltered gullies (large species attaining 25 m.; prop-

roots numerous, 4–5 m. long, not wide-spreading; crown branched; leaves rather short (± 1.5 m.), more glaucous above than below; inflorescence terminal; fruit-heads (the one collected measured 37 cm. long, 17.5 cm. broad) more or less hidden among the leaves; lower fleshy part of the ripe drupes red, upper part purple-brown).

At first glance the fruit-head of this species strongly suggests *Pandanus aggregatus* Merr. & Perry, although the drupes are a little shorter and appear to be somewhat clustered, lacking the uniformity characteristic of the latter species. A closer examination shows these small clusters to be phalanges 2–3(or sometimes –4)-loculed (simple drupes also occur); for this reason, *Pandanus brachyphyllus* has been placed in the section Hombronia. It is to be noted, however, that it is very distinct from the other known Papuan members of this section.

Pandanus brosimos sp. nov. § *Bryantia.* Plate I, figs. 12–15.

Arbor ad 20 m. alta, superne divaricato-ramosa, basi radicibus aëreis longis suffulta; trunco radicibusque aculeatis; foliis ± 3.5 m. longis, basi dilatatis, ± 18 cm. latis, sursum angustatis, medio circiter 9–10 cm. latis, sensim longe acuminatis; basim versus laevibus, demum subtus crebre venoso-striatis, supra lineis longitudinalibus impressis ± obscuris percursis, in parte superiore plicatis; plicis lateralibus inermibus; costa media superne spinuloso-serrata, basim versus laevi; margine (probabiliter laevi) supra basim per spatium longiusculum (± 35 cm.) ± fracto, sursum remotiuscule dentato-serrato; dentibus validiusculis, curvulis; syncarpio pendulo, solitario, terminali, ellipsoideo, 28 cm. longo, 21 cm. diametro; drupis numerosis (immaturis), ± prismaticis, 6 cm. longis, 1–1.3 cm. latis, pentagonis, basi angustatis; pileo libero, circiter 1.3 cm. longo, pyramidato, vertice oblique explanato vel oblique convexo, stigmate bilobo coronato; mesocarpio supero ± 2 cm. longo, fibroso; endocarpio osseo, 3–3.5 cm. longo, in vertice rotundato ibique 6–10 mm. lato.

Netherlands New Guinea: 18 km. southwest of Bernhard Camp, Idenburg River, *Brass 12698* (type), February 1939, alt. 2150 m., mossy-forest, plentiful in open places on the slopes (up to 20 m. high, the stem branched to form a spreading crown; stilt-roots long but not wide-spreading; stem and stilt-roots prickly; leaves ± 3.5 m. long, glaucous underneath, broad at the base; fruit-heads terminal and pendent below the leaves, ovoid, 28 × 21 cm.; drupes a very pale glaucous green; unripe seeds large).

Mr. Brass points out that "although growing in the forests of uninhabited mountains, there is evidence to show that the trees are visited

by the natives of the neighboring valley. The species is probably identical with the one which is planted or preserved for its edible seeds on the slopes of the Snow Mountains, north and northeast of Mount Wilhemina."

Pandanus brosimos evidently belongs to the same section as the plant we take to be *P. Jiulianettii* Mart. (another species used for food) but we have not yet found any species with drupes closely resembling the ones described above.

Pandanus leptocaulis sp. nov. § *Bryantia*. PLATE I, FIGS. 22–24.

Planta ± 2 m. alta, non ramosa, radicibus aëreis deficientibus; foliis superioribus subcoriaceis, infra inflorescentiam pedunculo 10–13 cm. longo fultam, 80–140 cm. longis, 2 cm. latis, sursum sensim attenuatis, basim versus paullo dilatatis, amplexicaulibus; costa media subtus prominente, acuta, in parte inferiore inermi, sursum remote denticulato-serrata; plicis lateralibus obtusis, inermibus, margine in parte basilari nudo, sursum ± remotiuscule breviterque serrato-dentato; inflorescentiis terminalibus; syncarpiis in collectione typica 1–3, modice approximatis, aurantiacis; singulo syncarpio cum spatha propria, chartacea, naviculari, longitudinaliter venosa, oblongo, 6–9 cm. longo, circiter 3.5 cm. lato; drupis numerosis, 12–15 mm. longis, 3–4 mm. latis, ± angulatis, parte apicali libera, 3–4 mm. longa, superne convexa, stigmate convexiuscule discoideo, ± 1.5 mm. lato, subbilobo; mesocarpio supero concavo, 3 mm. longo; endocarpio 4–5 mm. longo.

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass 13280, 13328* (TYPE), March 1939, alt. 900 m., very abundant in mossy-forest and the characteristic undergrowth on crests of ridges (slender species ± 2 m. high, without stilt-roots; not branched; fruit-heads orange).

Among the duplicates of the type-number there are two specimens each with a solitary syncarp, the other inflorescences have either two or three syncarps, the latter we take to be the usual condition.

Among the species of the section BRYANTIA with racemose inflorescences, *Pandanus leptocaulis* is best distinguished by the oblong syncarps, the fairly large convex stigmas of the drupes, and the narrow leaves.

Pandanus concinnus sp. nov. § *Lophostigma*. PLATE I, FIGS. 16, 17.

Arbor ± 5–6 m. alta; trunco brevi, non ramoso, basi radicibus aëreis longis crassisque suffulto; foliis chartaceis, 140–160 cm. longis, 4 cm. latis, apicem versus sensim attenuatis et acuminato-subulatis, laevibus

vel subtus crebre venoso-striatis, basi non dilatatis, non armatis, sursum margine dentato-serratis; dentibus basim versus validiusculis patulo-ascendentibus, sursum brevioribus crebriusculisque, ascendentibus; plicis lateralibus laevibus et ± obscuris; costa media minute spinuloso-serrata; syncarpio solitario, terminali penduloque, ovoideo, 16 cm. longo, 14 cm. diametro; pedunculo in specimine sicco 25 cm. longo; drupis uniloculari-bus, connatis, numerosissimis, 4–4.3 cm. longis, 3–4 mm. latis, penta-hexagonis, in parte apicali libera (5–7 mm. longa) anguste pyramidatis; stylo in vertice subplano, acumine brevissimo et paullo lobato vel denti-formi instructo; stigmate infra acumen lateraliter disposito; endocarpio fere ad basim drupae sito, osseo, circiter 8 mm. longo; mesocarpio fibroso.

Netherlands New Guinea: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass 12074* (type), January 1939, alt. 1800 m., mossy-forest, occasional in gullies (± 5–6 m. high; stem short, unbranched, on long stout prop-roots; fruit-head terminal, pendent below the leaves, conical, purplish brown, 16 cm. long, 14 cm. diameter).

A very distinct species which, only in the fairly long, free, somewhat glossy and oblique apices of the drupes, shows some similarity to *Pandanus lamprocephalus* Merr. & Perry. The drupes closely resemble those of *P. atropurpureus* Merr. & Perry, but the projection of the style beyond the flattened vertex is much shorter than in the latter species.

Pandanus atropurpureus sp. nov. § *Rykia?* Plate I, figs. 9–11.

Arbor 8.5(–16) m. alta, basi radicibus aëreis suffulta; foliis ± 2.75 m. longis, basi paullo dilatatis, ± 13 cm. latis, medio circiter 9–10 cm. latis, sursum sensim acuminatis; basim versus ± tessellatis; plicis lateralibus inermibus; costa media basim versus laevi, sursum spinuloso-serrata; margine supra basim per spatium breve (± 10 cm.) inermi, sursum dentato-serrato; dentibus in parte superiore minutis, arcte ascendenti-bus; spathis chartaceis, navicularibus, margine et costa media subtus minute dentato-serratis; syncarpio terminali, 35 cm. longo, 17.5 cm. diametro; drupis numerosissimis, unilocularibus, connatis, 4–4.5 cm. longis, 3–5 mm. latis, penta—hexagonis; pileo pyramidato, in parte superiore libero, vertice subrotundato vel planiusculo, procurvo, in stylum angustum obliquumque circiter 1 mm. latum, 1–2 mm. longum, planum, corneum (?), simplicem vel dentiformem producto, apicis facie ventrali stigmatica; endocarpio fere ad basim drupae sito, osseo, tenui, 8–10 mm. longo.

Netherlands New Guinea: 4 km. southwest of Bernhard Camp. Idenburg River, *Brass 13648* (type), March 1939, alt. 850 m., occa-sional in the rain-forest of the slopes (stem 8.5 m. long, not branched;

stilt-roots short, ± 1.5 m. in length; leaves ± 2.75 m. long, the underside glaucous; inflorescence terminal; fruit-head 35 cm. long, 17.5 cm. diameter [upper drupes missing]; drupes red, the upper hard part purple-black); *Brass 13621,* plentiful in the more open and swampy parts of the flood-plain rain-forests (large species ± 14–16 m. high, with branched crown and long stilt-roots; leaves ± 3 m. long, glaucous underneath; inflorescence terminal; fruit-head, minus the upper drupes, 43 cm. long, 20 cm. diameter; lower soft part of the drupes yellow, upper hard part purple-black).

On account of the unusually long and projecting (perhaps slightly corneous) tip of the style with the stigma on the ventral surface, we are inclined to associate *Pandanus atropurpureus* with the section RYKIA (not known from Papua) rather than with LOPHOSTIGMA, although the latter is the section to which a great many species of the Papuasian region belong. In doing so, nevertheless, we point out the similarity in the shape of the heads of the drupes of *P. lamprocephalus* Merr. & Perry, *P. concinnus* and this species. As a matter of fact the entire structure of the drupe of *P. concinnus* closely approaches that of *P. atropurpureus,* although the two plants themselves are vastly different in gross aspect.

Pandanus Odoardi Martelli, Bull. Soc. Bot. Ital. **1904:** 304. 1904; Webbia **4**(1): 25. 1913, **4**(2): *t. 39, f. 6–11.* 1914; Merr. & Perry, Jour. Arnold Arb. **20:** 182. 1939.

Pandanus papuanus Ridl. Trans. Linn. Soc. II. Bot. **9:** 237. 1916, non Solms-Laub. (1883).

NETHERLANDS NEW GUINEA: 2 km. southwest of Bernhard Camp, Idenburg River, *Brass 13620,* alt. 700 m., rain-forest undergrowth (stemless; peduncle erect; fruit-head green). Endemic.

Although the syncarp is somewhat immature, the drupes a little smaller than those of *Brass 7190* (from Palmer River), and the apices of the drupes very little, if at all, granular; nevertheless, both appear to belong to the same species.

The photograph of *Pandanus papuanus* Ridley received from the British Museum through the courtesy of Dr. J. Ramsbottom, is fairly convincing evidence that this plant is conspecific.

It should have been noted in our last paper that Martelli's description of *Pandanus Odoardi* begins "Syncarpia spicata" without any indication of the number of syncarps in the spike. In our material the syncarp is solitary. Nevertheless, since the other characters of the description and those of the collections agree reasonably well, we cannot do more at present than call attention to this difference.

Pandanus adinobotrys sp. nov. § *Acrostigma*. PLATE I, FIGS. 5–8.

Arbor 6–7 m. alta; trunco non ramoso, radicibus aëreis deficiente; foliis rigidiuscule coriaceis, ± 3.25 m. longis, basi 9.5 cm. latis, medio circiter 7 cm. latis, apicem versus sensim attenuatis, apice acuminatis, basim versus non dilatatis, supra tessellato-granulosis, subtus crebre venoso-striatis; plicis lateralibus obtusis, inermibus; costa media subtus prominente, acuta, spinuloso-serrata, basim versus spinis robustis patulis vel retrorsis hinc inde instructa; margine robuste acuteque serrato-dentato, in parte basilari dentibus validis horizontalibus, ± 4 mm. longis, sursum minoribus, in parte apicali crebris minutisque; inflorescentiis axillaribus; pedunculo circiter 30 cm. longo; syncarpiis 9, ad apicem pedunculi dense confertis et spicatim dispositis (spica 17 cm. longa, 11.5 cm. diametro), quove globoso-reniformi vel leviter compresso, 4–5.5 cm. longo, 6–8.5 cm. lato; drupis numerosis, 2 cm. longis, 0.5 cm. latis; pileis inter se in parte inferiore agglutinatis, a druparum parte seminifera facile secedentibus, angulosis, conoideis (± 7 mm. longis), in stylum (± 7 mm. longum) spiniformem desinentibus; stigmate anguste lineari; parte seminifera 11–13 mm. longa; mesocarpio supero concavo; endocarpio circiter 8 mm. longo, supra plano-truncato.

NETHERLANDS NEW GUINEA: 15 km. southwest of Bernhard Camp, Idenburg River, *Brass 12077* (TYPE), January 1939, alt. 1800 m., mossy-forest, common in seral growths (6–7 m. high; no prop-roots; stem not branched; leaves stiff, drooping, ± 3.25 m. long, glaucous underneath; inflorescence paniculate, axillary; fruit-heads 9, pale red).

In the compact spicate infructescence and the broader than long syncarps this species is most like *Pandanus setistylus* Warb.; but, the drupes have long conical apices tipped by spine-like styles of approximately the same length; whereas, in *P. setistylus* Warb., the spine-like styles of the drupes are at least three times as long as the very short apices. In addition, the leaves of *P. adinobotrys* are larger than those of the related species.

PITTOSPORACEAE

PITTOSPORUM Banks

Pittosporum berberidoides Burkill, Kew Bull. **1899**: 96. 1899; E. Pritzel in Engler, Nat. Pflanzenfam. ed. 2, **18a**: 276. 1928.

BRITISH NEW GUINEA: Central Division, Mount Albert Edward, *Brass 4399*, in forests, alt. 3680 m., common (erect, branched, slender tree 3–6 m. tall; branchlets and petioles purple-red; corolla with whitish tips; anthers yellow; fruit and seeds black). Apparently the first record

of a collection of this Papuan species since the original description was published.

Some little variation from the diagnosis of *Pittosporum berberidoides* Burk. may be noted, as the branchlets are 3–4 mm. thick, the leaves up to 3.5 cm. long, 2.5 cm. broad, petiole about 1 cm. long and apparently odorless. We add a brief summary of floral characters: flowers solitary (on peduncles ± 2 cm. long), in bud about 12 mm. long; sepals 5, separate, narrowly ovate (3 mm. long), ciliate, acutish; petals 5, free, broadly linear (12 mm. long, 2.5 mm. broad), obtuse, 3-nerved, recurved at the apex, margin minutely ciliolate; stamens 5, about 7 mm. long, filaments slender, slightly thickened towards the base, anthers narrowly ovate (2 mm. long), cordate; ovary (3.5 mm. long) scarcely stipitate, glabrous; placentae 2, each 6-ovulate; style glabrous; stigma not at all thickened.

Pittosporum pullifolium Burkill, Kew Bull. **1899:** 96. 1899; E. Pritzel in Engler, Nat. Pflanzenfam. ed. 2, **18a:** 276. 1928.

BRITISH NEW GUINEA: Central Division, Mount Albert Edward, *Brass 4222*, alt. 3680 m. NETHERLANDS NEW GUINEA: Lake Habbema, *Brass 9087A*, alt. 3225 m.; 2 km. east of Wilhemina-top, *Brass & Myer-Drees 9798, 10211, 10129*, alt. 3800 m.; 7 km. northeast of Wilhemina-top, *Brass & Myer-Drees 9955, 9993*, alt. 3560 m.; 11 km. northeast of Wilhemina-top, *Brass 11853*, alt. 3400 m. According to the field notes, a stiff shrub or small tree 1–5 m. high, common in forest borders. Type from Mount Scratchley, British New Guinea; apparently unreported since the original collection.

In most of our specimens the leaves are a little larger (up to 7.5 cm. long, 3.5 cm. broad) than the measurements of the type-specimens (as found in the description); the apex varies from cuspidate to obtuse or retuse, the upper surface is rugose. The specimens have both flowers and fruit. The dried capsules are orange-colored or brown, chiefly glabrous, ellipsoid (1.5–2.3 cm. long), shortly mucronate at the apex, and 2-valved; seeds numerous, each on a short (± 2 mm. long) funiculus, biseriate on both placentae, purple or purple-black, horizontally compressed.

Pittosporum ramiflorum Zoll. ex Miq. var. **parvifolium** Merr. & Perry, var. nov.

Omnibus partibus quam in forma typica paullo minoribus; foliis ellipticis, abrupte acutis, 4–8 cm. longis, 2–4 cm. latis; inflorescentiis 2–2.5 cm. longis; petalis circiter 5.5 mm. longis, trinerviis; ovario 2 mm. longo, in dimidio inferiore pubescente; stylo 2 mm. longo, glabro.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass 10575* (TYPE of var.), October 1938, alt. 2800 m., banks of a forest stream (very slender small tree 5–8 m. high; flowers yellow, fragrant); *Brass & Versteegh 10474*, alt. ± 2740 m. (tree 18 m. high, 28 cm. diameter).

These collections have been set apart on account of the smaller leaves and the somewhat smaller inflorescence. The species is represented by the following numbers, some of which are transitional forms:

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass 10597, 10649, 10650, 10857*, alt. 2800 m.; Lake Habbema, *Brass 9357*, alt. 3225 m.; Bele River, 18 km. northeast of Lake Habbema, *Brass 11379, 11381*, alt. 2200 m.; Balim River, *Brass 11708, Brass & Versteegh 11190*, alt. 1600 m. and 2160 m.; 2 km. southwest of Bernhard Camp, Idenburg River, *Brass 13475*, alt. 800 m.

E. Pritzel in Engler, op. cit. 276, noted that this panmalaysian species had not been reported from the Solomon Islands. The following collection appears to be a reasonably good match for the Papuan material of this species: Ysabel Island, Tiratona, *Brass 3307*, at 600 m. alt. *Kajewski 2625* from Guadalcanal Island may also belong here.

Pittosporum Versteeghii sp. nov. § *Eupittosporum*.

Arbor 22 m. alta, 27 cm. diametro; ramulis novellis ferrugineo-tomentosis, ad maturitatem glabratis; foliis subverticillatis, 6–10 cm. longis, 2.5–4 cm. latis, late lanceolatis, abrupte ac oblique acuminatis, basi acutis, margine integris ac anguste revolutis, longiuscule petiolatis (petiolo 1–2 cm. longo, ± tomentoso), supra rugulosis, glabris, interdum costa media pubescente, subtus ferrugineo-tomentosis demum glabrescentibus, nervis lateralibus utrinque 5–7, prominentibus procul a margine laxe reticulato-anastomosantibus, venulis laxe reticulatis; inflorescentiis terminalibus; pedunculo brevi (4 mm.) vel nullo; floribus singulis vel umbellatis, umbellis paucifloris (usque 5-floris), pedicellatis; pedicellis 1 cm., fructigeris ad 1.5 cm. longis; sepalis lanceolatis, 5.5 mm. longis, acuminatis, apice recurvis, subtus tomentosis, supra glabratis; petalis liberis, linearibus, 7.5 mm. longis, acutis, trinerviis; staminibus vix 5 mm. longis, filamentis tenuibus; antheris 0.8 mm. longis, apiculatis; ovario ellipsoideo, 3–3.5 mm. longo, adpresso-hirsuto, sessili; stylo glabro, 1.5 mm. longo; stigmate crasso, leviter bilobo; capsula bivalvi, subglobosa, ± 8 mm. diametro, vel paullo latiore quam longa, vix compressa, glabrata; seminibus angulatis.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass & Versteegh 10456* (TYPE), October 1938, alt. ± 2860 m., com-

mon in old secondary forest (tree 22 m. high, 27 cm. diameter; flowers yellow; fruit orange-colored).

At first glance this collection suggests *Pittosporum ferrugineum* Ait., a wide-spread species of the lower altitudes. It differs, however, in the reduced or very short (often lacking) axis of the inflorescence, the relatively few flowers (1–5) in an inflorescence, and the rugulose, prominently veined leaves.

Pittosporum Brassii sp. nov. § *Chelidospermum*.

Frutex 1–2 m. altus; ramis cinereis; ramulis novellis fulvo-pubescentibus; foliis subverticillatis, 6–16 cm. longis, 2–2.5 cm. latis, anguste obovatis, abrupte acuminatis, basi cuneato-acutis, margine integris vel repandulis, breviter petiolatis (petiolo 0.5–1 cm. longo, glabro vel sparsissime piloso), utrinque glabris, in sicco supra viridulis vel olivaceis, subtus pallidioribus, venis utrinque circiter 5–7, a margine distanter (5–9 mm.) arcuato-conjunctis, venulis laxe reticulatis; stipulis linearibus, caducis; inflorescentiis terminalibus; pedunculo crassiusculo (± 2 mm. lato), fulvo-pubescente; floribus 3–8, pedicellatis; pedicellis fulvo-pubescentibus bracteatis, ± 3 mm. longis (fructigeris ± 8 mm. longis, 1 mm. latis); sepalis lineari-lanceolatis, 4 mm. longis, glabris, ciliatis; corolla tubulosa, glabra, lobis obtusis, recurvis; filamentis liberis, antheris linearibus; ovario ± 3 mm. longo, oblongo, fusco-pubescente; stylo glabro, ± 4 mm. longo; capsula subglobosa, vix 2 cm. diametro, sessili, aurantiaca, glabrata (sparse pilosa), bivalvi; seminibus ± 20, longe funiculatis, nigris.

NETHERLANDS NEW GUINEA: Idenburg River, 18 km. southwest of Bernhard Camp, *Brass 12671* (TYPE), February 1939, alt. 2150 m., in bamboo undergrowth of mossy-forest ("tree" 2 m. high; flowers pink); *Brass 12694*, alt. 2000 m., in undergrowth of a rain-forest gully ("tree" 2 m. high); 9 km. northeast of Lake Habbema, *Brass 10996*, October 1938, alt. 2700 m., in forest of valley bottom (one example: shrub 1 m. high; fruit orange, seeds black).

In the section CHELIDOSPERMUM, endemic to New Guinea, five species and one variety (*P. sinuatum* Blume, *P. chelidospermum* Blume, *P. novoguineense* Miquel, *P. Galai* K. Schumann, *P. quinquevalvatum* Warburg, and *P. Galai* var. *stipulosa* K. Schum. & Lauterbach) have previously been described. These have been reduced one after another to the synonymy of *P. sinuatum* Bl., until, in the latest summary of the section, Engler, Pflanzenfam. ed. 2, **18a**: 275. 1928, E. Pritzel treated the five species jointly as *P. sinuatum* Bl. Although we have no original or authentic material for comparison, the following specimens appear to be typical *P. sinuatum* Bl.: *Brass 3840, 5622, 6812, 6849, 7009, 13471,*

13675. All these except *Brass 6812* are good fruiting specimens showing an ellipsoid or obovate capsule with a short stipe (4–5 mm.) above the thick pedicel, and the infructescence axis is so short that it is sometimes difficult to distinguish both pedicel and peduncle. This stipitate character is clearly foreshadowed in the flowers of *Brass 6812;* here the ovules are borne 2–2.5 mm. above the base of the ovary, which is ± fusiform.

On the other hand, the capsule of *Pittosporum Brassii* is subglobose and sessile, borne on a slender pedicel clearly distinguishable from the peduncle; likewise the ovary is sessile and ± ellipsoid. On the whole both the flowers and the leaves are a little smaller than those of *P. sinuatum* Bl.

ROSACEAE

Rubus Linnaeus

Rubus Macgregorii F. v. Muell. Trans. Roy. Soc. Victoria I. **2:** 4. 1889; Focke, Abhandl. Naturw.-Ver. Bremen **13:** 165. 1894, Bot. Jahrb. **54:** 72. 1916; van Steenis, Bull. Jard. Bot. Buitenz. III. **13:** 245. 1934.

British New Guinea: Central Division, Mount Albert Edward, *Brass 4312,* May–July, 1933, alt. 3600 m., in grassland shrubbery near the edge of the forest (low rambling shrub; branches dark purple; petioles and sepals purple-red; petals greenish white; fruit immature).

Mr. C. T. White reports that this plant is an exact match for Mueller's type (fide Mr. J. F. Rae). Since this is a somewhat perplexing species previously known only from the type-collection, it seems worth while to record this second collection with the field-note.

Focke apparently did not include *Rubus Macgregorii* F. v. Muell. in his "Species Ruborum" (1910–1914) but in 1916, having then seen a scanty specimen representing the original collection, gave an amplified description (Bot. Jahrb. **54:** 72), although he was unable to indicate its proper section; and van Steenis (Bull. Jard. Bot. Buitenz. III. **13:** 245. 1934) records it as an isolated species. In accordance with his characterizations of subgenera and sections, the species clearly falls in Orobatus as delimited by Focke. In his "Species Ruborum" only one species of the subgenus, *Rubus Copelandii* Merr. of the Philippines, has been reported from the Old World, all others being from South America (one species extending across the Isthmus of Panama into Costa Rica).

Rubus dendrocharis Focke, Bot. Jahrb. **54:** 70. 1916.

Rubus Hasskarlii Miq. subsp. *dendrocharis* Focke, Bibl. Bot. **17:** 99. 1910.

Netherlands New Guinea: Bele River, 18 km. northeast of Lake

Habbema, *Brass 11376*, November 1938, alt. 2200 m. (scrambling in open grassy second growths on garden clearings; branches white). SOLOMON ISLANDS: Malaita Island, Quoimonapu, *Kajewski 2377*, alt. 300 m., in rain-forest (a prickly vine climbing in rain-forest trees; leaves brown beneath, covered with a dense tomentum; fruit shiny red when ripe).

This is one of the forms of that either multiple or variable species, *Rubus moluccanus* L., with a fairly distinctive leaf-outline.

In addition to the above we have at hand several collections from British New Guinea, Netherlands New Guinea and the Solomon Islands, which are surely very close to, if not identical with, *R. moluccanus* L. It should be pointed out also that some of these (particularly from Mafulu, Tarara and Biriatabu) closely resemble and ought to be compared with *R. Hillii* F. v. Muell. (if this be a distinct species).

Focke saw no Amboina material representing *Rubus moluccanus* L. but reproduced the Rumphian plate on which the Linnean binomial was based. *Robinson 270* from Amboina clearly represents the typical form of *R. moluccanus* L.

Rubus Archboldianus sp. nov. *Idaeobatus* § *Alpestres*.

Frutex scandens, ramis teretiusculis petiolisque glabris vel sparse pubescentibus, aculeis minutis recurvis conspersis instructis; foliis trifoliatis, coriaceis; petiolo 2–3.7 cm. longo; foliolis petiolulatis, late obovatis vel ellipticis, apice saepe rotundatis, basi cuneatis vel obtusis, inciso-serratis, basim versus integris, utrinque 5–8-nervatis (nervis supra impressis subtus elevatis interdum minute pubescentibus), costa pubescente interdum subtus aculeata excepta glabris, foliolo terminali 2.7–5.5(–9) cm. longo, 2–3.5(–5) cm. lato, petiolulo 4–6 mm. (–2 cm.) longo, foliolis lateralibus minoribus paullo obliquis, petiolulis ± 2 mm. longis; stipulis in lacinias lineares fissis vel partitis; floribus solitariis terminalibus; pedunculo brevissimo (5–7 mm. longo); bracteis circiter 4-fissis, lacinulis linearibus; calyce extus tomentoso; cupula pelviformi, aculeata; sepalis utrinque tomentosis, ovatis, 1.5 cm. longis, exterioribus apice (interdum margine) subfimbriato-fissis; petalis vix 1.5 cm. longis, ovatis, obtusiusculis, margine erosis; staminibus (in flore unico dissecto) circiter 55; carpellis numerosis, dense pubescentibus vel villosis; fructibus immaturis (?) circiter 1.5 cm. diametro, carpellis siccis dorso villosis, ad latera glabris; putamine grosse lacunoso-rugoso.

BRITISH NEW GUINEA: Central Division, Wharton Range, Murray Pass, *Brass 4565* (TYPE), July–September 1933, alt. 2840 m., forest undergrowth (few plants observed scrambling amongst trailing bamboo;

branches and petioles, peduncles and calyx reddish brown; corolla red); Mount Tafa, *Brass 4012*, alt. 2310 m., rare at the edge of low, mossy-forest (large rambler; stiff leaves; dark red flowers).

Although these two collections undoubtedly represent the same species, *Brass 4012* has much larger leaves (terminal leaflet elliptic or ovate-elliptic, acute at the apex, rounded or obtuse at the base, ± 9 cm. long, 5 cm. broad, petiolule up to 2 cm. long); the flowers and the stipules are similar to those of the type. This difference in foliar characters is probably the result of growth in contrasting habitats, or possibly the type is from a mature plant and the other specimen from a relatively young one.

The species closely resembles *Rubus alpestris* Blume in both the floral and the stipular characters. It differs principally in the very distinctly petiolulate leaflets. Possibly on account of the latter character *R. Archboldianus* should have been placed in the PUNGENTES, but we believe its natural affinities are with the ALPESTRES.

Rubus Lorentzianus Pulle, Nova Guinea 8(4): 647. 1911.

NORTHEASTERN NEW GUINEA: Sarawaket, *Clemens 5591, 10222*, alt. about 3000 m. and 3300–4000 m. NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass 10632*, alt. 2800 m., mossy-forest, often scrambling in forest openings; Lake Habbema, *Brass 9131*, alt. 3225 m., scrambling to 3–4 m. in forest edges (branches, spines, petioles and calyx reddish). Type from Netherlands New Guinea.

As far as can be determined from the description these collections belong to *Rubus Lorentzianus* Pulle. Perhaps the pubescence is less than in the original; however this character varies considerably in the specimens cited, no. *9131*, except the inflorescence, being practically glabrous. Probably belonging here also are two other collections differing only in being essentially glabrous and somewhat less aculeate (prickles are lacking from the primary veins of the leaves): 9 km. northeast of Lake Habbema, *Brass 10980*, alt. 2700 m., plentiful in forest openings (rambling shrub with very smooth pale branches; flowers white; fruit red); and, Bele River, 18 km. northeast of Lake Habbema, *Brass 11262*, alt. 2200 m., frequent in forest openings.

Rubus Muelleri F. M. Bailey, Proc. Roy. Soc. Queensl. 1: 9. 1884, Queensl. Flora 2: 527. 1900, Comprehens. Catal. Queensl. Pl. 167, *f. 134*. 1912; Domin, Bibl. Bot. 22: 717. 1925.

SOLOMON ISLANDS: Bougainville Island, Kupei Gold Field, *Kajewski 1629*, alt. 850 m., common, rain-forest (up to 3 m. high, rambling; flow-

ers white; fruit edible, red). Previously not recorded from outside of Queensland.

This specimen with occasionally laciniate bracts corresponds very well with a collection of *Rubus Muelleri* F. M. Bail. from Queensland.

Rubus papuanus Schlechter in Diels, Bot. Jahrb. **62**: 481. 1929.

BRITISH NEW GUINEA: Central Division, Mount Albert Edward, *Brass 4246,* alt. 3680 m., rare, in sheltered place among rocks on grassland (soft wooded shrub up to 1 m.; branches and prickles red; leaves pale green; petals white; fruit red, sour). Reported previously only from Mount Sarawaket, Northeastern New Guinea.

Rubus Brassii sp. nov. *Idaeobatus.*

Frutex vagans, usque 4 m. altus; ramis inermibus, pallidis; foliis chartaceis, longe petiolatis (petiolo usque 5.5 cm. longo), pedato-quinatis, superioribus ternatis, foliolo terminali usque circiter 12 cm. longo, 3.7 cm. lato, longe petiolulato (petiolulo usque 2 cm. longo), foliolis lateralibus paullo minoribus, brevissime petiolulatis (petiolulis 2–3 mm. longis), omnibus lanceolatis, basi obtusis, apice acutis, margine inaequaliter serratis, utrinque praeter costam pubescentem subtus praeter nervos puberulos glabris, utrinque circiter 18–24-nervatis; stipulis lanceolatis vel linearibus; inflorescentiis in apice ramorum subcorymboso-paniculatis plurifloris; ramis pubescentibus; bracteis lanceolatis vel oblongis, incisis vel in lacinulas fissis; pedunculo ± 1 cm. longo, pubescente; sepalis late lanceolatis, acuminatis (fere aristatis), subtus margine tomentoso excepto leviter pubescentibus, supra tomentosis; petalis albis sepalis paullo longioribus, obovato-ellipticis; staminibus numerosis, filamentis apice paullo angustatis; disco inter stamina et carpella manifesto; carpellis numerosis, minute pubescentibus; stylo tenui; fructibus maturis rubris e drupeolis multis cohaerentibus compositis.

SOLOMON ISLANDS: San Cristobal Island, Hao River Headwaters, *Brass 2891* (TYPE), September 20, 1932, alt. 750 m., crest of a forest spur, common (large straggling shrub; stems unarmed and very pale; leaves pale with sunken nerves; flowers white); Guadalcanal, Ululolo, Tutuve Mountain, *Kajewski 2530,* April 17, 1931, alt. 1200 m., rainforest, common (a small to medium shrub up to 4 m. high; flowers white; fruit red, typically raspberry).

Although this species seems to belong to the subgenus IDAEOBATUS, we have been unable to locate it satisfactorily in any section by Focke's key. It falls nearest to the ALPESTRES, but can scarcely belong there. The species is quite distinct in its lack of armature and the unusual arrangement of the leaflets.

Rubus diclinis F. v. Muell. Trans. Roy. Soc. Victoria I. **2**: 5. 1889; Focke, Bibl. Bot. **17**: 220. 1911, Bot. Jahrb. **54**: 71. 1916.

British New Guinea: Central Division, Wharton Range, Murray Pass, *Brass 4712*, June–September 1933, alt. 2840 m., common in forest fringe and open types of forest (rambler or climber, at times assuming proportions of a small liane; flowers cream-colored; berries pubescent, dull brown with purple-red flesh).

Mr. C. T. White reports this collection to be a good match for co-type material in the Queensland Herbarium. A very obvious character of this species is the pubescence of the carpels. From Northeastern New Guinea, however, we have two collections (*Clemens 4553, 10343*) with somewhat more compact inflorescence but with essentially glabrous carpels. These might possibly represent Focke's var. *papuana* (Bot. Jahrb. **54**: 72. 1916) which he described as having somewhat larger leaves than the typical *R. diclinis* of New South Wales. As yet we have not found any record of *R. diclinis* F. v. Muell. from New South Wales except as the name (appearing a second time in "Species Ruborum") is given in italics under *R. Moorei* var. *Leichhardtianus* Domin, Bibl. Bot. **19**: 272. 1914 (Heft. **83**[1]: 48). The species was originally described from specimens collected by Sir William Macgregor on Mount Knutsford and Mount Musgrave, New Guinea.

Rubus novoguineensis sp. nov. *Lampobatus*.

Suffrutex scandens, dioicus; ramulis petiolisque dense pubescentibus, aculeis brevibus recurvisque instructis; foliis 3–5-foliatis, coriaceis; petiolo 1.5–2.5 cm. longo; foliolis petiolulatis, ellipticis vel oblongis, basi apiceque obtusis, margine inciso-serratis, utrinque 5–8-nervatis (nervis supra valide impressis, subtus prominentibus denseque pilosis), supra in sicco fuscis, consperse pilosis, subtus pallidioribus, (nervis costaque consperse aculeatis exceptis) glabriusculis; foliolo terminali 2.5–3.5 cm. longo, 1–1.7 cm. lato, petiolulo 5–9 mm. longo; foliolis lateralibus paullo minoribus; petiolulis 2–4 mm. longis; stipulis deciduis; inflorescentiis axillaribus, racemosis vel (?) racemoso-paniculatis, ramis pedunculisque tomentosis consperse glanduloso-stipitatis; sepalis oblongis (3 mm. longis), obtusis, tomentosis, subtus glandulis longe stipitatis copiose instructis; petalis subaequilongis, utrinque ad basim tantum pubescentibus; staminibus deficientibus; carpellis ± 12, dense tomentosis, semimaturis pubescentibus glandulis longe stipitatis instructis; stylo glabro.

British New Guinea: Central Division, Mount Albert Edward, *Brass 4337* (type), May–July 1933, alt. 3680 m., common, trailing on forest floor and burnt timber on forest fringes (leaves dark green above; fruit brown, in clusters up to 2.5 cm.).

Rubus novoguineensis is similar in habit to both *R. paradoxus* Ridley and *R. Moorei* F. v. Muell., but perhaps more like the former than the latter in the impressed venation, the size of the leaves, the short petiolules, and the relatively few carpels. It differs from both in the glandular-pubescent fruit, the narrower leaflets, and the dense pubescence of the young shoots.

Rubus paradoxus Ridley appears to be represented in our material by *Brass 9133,* Lake Habbema, 3225 m. alt. (forming dome-shaped masses 1.5–2 m. high in shrubberies of forest margins; flowers green; fruit black, very sour). To the Australian species *R. Moorei* F. v. Muell., already reported from Northeastern New Guinea by Focke, belong the following: 9 km. northeast of Lake Habbema, *Brass 10773,* alt. 2700 m., tall moist forest of a valley bottom (large liane; flowers white); 4 km. southwest of Bernhard Camp, Idenburg River, *Brass 13083,* alt. 850 m., common in seral rain-forest on low flood banks of river (large scrambling shrub; flowers white).

Potentilla Linnaeus

In a consideration of mountain floras, both Diels (Bot. Jahrb. **62**: 481. 1929), and van Steenis (Bull. Jard. Bot. Buitenz. III. **13**: 242, 243. 1934), have recently commented briefly on the Papuan species of *Potentilla;* the former accepts the Papuan species as specifically different from, though related to, the Indian ones; the latter indicates that the Papuan species are nearly related to SE. Asiatic ones and thinks that they "only represent forms of these." He notes further, "Section Leptostylae — Anserinae.— The Malaysian species of this group belong to a Himalayan stock and centre round the *leuconota-Mooniana-microphylla* alliance."

The recent Mount Wilhemina collection, rich in *Potentilla,* confirms both opinions and also contributes a little additional information. A number of the species have only 5 stamens (antisepalous), and relatively few achenes. According to Wolf's key of the subsection Potentillinae (Bibl. Bot. **16**: 15. 1908), these would belong to the genus *Sibbaldia.* Handel-Mazzetti (Symb. Sin. **7**(1): 520. 1933), in accepting *Sibbaldia* as a valid genus stresses the relative length of the anther and the filament as well as the broad base of the latter. In our specimens these characters do not seem to be wholly stable. Further, as we consider the variation which we have seen between plants with (4–)5 stamens and 5(–6) stamens, and 5(–6) and 10 stamens, we have hesitated to consider them as representing a group generically distinct from *Potentilla.*

The eight species in these collections appear to belong to the subsection

LEPTOSTYLAE, although both *P. Archboldiana* and *P. Brassii* have a habit strikingly different from the rest.

Potentilla Archboldiana sp. nov.

Planta caespitosa; caudice ramoso; ramis brevibus basi foliis fuscis dense obtectis, coma compacta foliorum viridescentium scaporumque coronatis; foliis usque 1.5 cm. longis, breviter petiolatis, bijugis, impari-pinnatis; foliolis subglabris, saepius praecipue ad apicem longe ciliatis, interdum lamina trichomis longis consperse vestita, lateralibus oblongis, obtusiusculis, bilobis vel interdum integris, foliolo terminali bilobo vel trilobo; rhachi glabra; stipulis circiter 6–8 mm. longis extus dense villosis; caulibus floriferis folia non excedentibus, simplicibus, foliis 2–4 diminutis (interdum bilobis) instructis, glabris, unifloris; calycis tubo circiter 1.5 mm. longo, glabro; segmentis (8–)10, 1.4–1.5 mm. longis, marginibus ad apicem consperse longeque ciliatis, exterioribus oblongis, obtusis, interioribus subtriangularibus, acutiusculis; petalis quam sepalis paullo longioribus; staminibus (4–)5; carpellis glabris, paucis (6–8); stylo laterali, circiter 0.8 mm. longo.

NETHERLANDS NEW GUINEA: northern slopes of Mount Wilhemina, *Brass & Myer-Drees 10133* (TYPE), September 1938, alt. 4100 m., alpine grassland (very common cushion plant); 7 km. northeast of Wilhemina-top, *Brass & Myer-Drees 9839*, September 1938, alt. 3560 m., common herb in alpine bogs (small yellow flowers).

The pubescence and the floral characters somewhat suggest those of *Potentilla perpusilloides* W. W. Sm. of Sikkim, but the leaves are larger and definitely pinnate. Quite distinct from any other species which we have seen.

Potentilla Brassii sp. nov.

Planta pygmaea; caudice ± 4 mm. crasso, coma pulvinata foliorum scaporumque terminato; foliis basalibus 1–1.5 cm. longis, vix 5 mm. latis, impari-pinnatis, 6–9-jugis, breviter petiolatis, stipulis subhyalinis praeditis; rhachi praecipue infra medium patenti-villosa apice saepius glabra; stipulis extus sericeo-villosis, apice libero 2–3 mm. longo, mox lacerato; foliolis glabris vel consperse pilosis, sessilibus, approximatis, in 2 (interdum 3) segmenta linearia inaequalia divisis; segmentis superpositis (?), ventralibus quam dorsalibus brevioribus; pedunculis scapiformibus circiter 2 mm. longis, glabris, foliis 1–2 diminutis praeditis, unifloris; calycis tubo glabro, segmentis (8–)10 glabris vel consperse pilosis, exterioribus 1.4 mm. longis, oblongis, obtusiusculis, interioribus 1.5 mm. longis, late ovatis, acutis; petalis (4–)5, 2.5 mm. longis, anguste obovato-oblongis,

rotundatis haud retusis; staminibus (4–)5; carpellis pluribus; stylo laterali, 0.6–0.8 mm. longo; carpellis maturis 1.4 mm. longis.

NETHERLANDS NEW GUINEA: 5 miles northeast of Wilhemina-top, *Brass 9427,* August 1938, alt. 3440 m., covering parts of an open boggy slope (each plant forming a distinct green rosette ± 1.5 cm. in diameter; very small yellow flowers); northern slope of Mount Wilhemina, *Brass & Myer-Drees 10156* (TYPE), September 1938, alt. 4120 m., abundant in alpine bogs; 2 km. east of Wilhemina-top, *Brass & Myer-Drees 10390,* alt. 3650 m., forming dense cushions in moist grassy places (flowers yellow; fruit red).

This is a smaller and more compact plant than any other of this genus which we have seen. The leaflets are unique in that their segments (2–3) seem to be approximately superposed one over the other, the shortest or (more frequently) the shorter lying on the top. This arrangement in a measure suggests that of the lowest segments in the leaves of *Potentilla verticillaris* Steph. but it is constant for the entire length of the rachis, and owing to the unequal length of the segments gives a much stronger impression (at least in the dried specimens) of superposition than of subverticillation. The pubescence of the lower part of the rachis and the stipules is dense; scattered hairs sometimes occur on the leaflets and the flowers, but mostly they are glabrous.

Potentilla habbemana sp. nov.

Caudex parvus subsimplex, radice fasciculata fibrosa praeditus, coma paucorum caulium floriferorum foliorumque terminatus; foliis basalibus lineari-oblongis usque 14 cm. longis (saepius circiter 7 cm.) 1–1.5 cm. latis, petiolatis, stipulis subhyalinis (extus sericeis) praeditis, ± 8–11-jugis, impari-pinnatis; foliolis sessilibus vel brevissime petiolulatis, ± approximatis, in segmenta linearia inaequalia acuta pluria (4–7) subpalmatim divisis, subtus sparse sericeo-pilosis vel utraque facie glabris; rhachi saepe sericeo-pilosa vel glabrata; caulibus floriferis pedunculisque saepe sericeo-pilosis; pedunculo 1–2.5 cm. longo, unifloro; calycis tubo sericeo vel glabrato; segmentis glabratis, 2–2.5 mm. longis, acutis, exterioribus late lanceolatis, interioribus subtriangularibus; petalis ± obovato-oblongis, ± 3 mm. longis; staminibus 5–6; carpellis numerosis; stylo laterali circiter 0.8 mm. longo; maturis carpellis glabris, vix carinatis, circiter 1.4 mm. longis.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass 9553, 9590, 9594* (TYPE), August 1938, alt. 3225 m., alpine grassland, abundant on marshy ground. A common alpine bog herb often covering the ground on open boggy flats, forming flat rosettes, ± 8–10 cm. diameter (in the

type-collection one plant 20 cm. diameter); leaves brownish green; flowers yellow.

A species with rather open loose habit, the finely cut leaves doubtfully suggesting the Indian *Potentilla microphylla* Don, but probably more nearly related to *P. parvula* Hook. f. Neither of the latter species have leaflets so deeply cut, nor as few stamens.

Possibly *Brass 4419* in part, Mount Albert Edward, British New Guinea, belongs here. This is a mixed collection, one plant with finely cut leaflets, another with coarsely incised leaflets; both have ten stamens.

Potentilla simulans sp. nov.

Caudex parvus coma foliorum et scapo e specimine viso unico terminatus; foliis basalibus 3–5 cm. longis, vix 1 cm. latis, lineari-oblongis, circiter 8–12-jugis, impari-pinnatis, breviter petiolatis, stipulis subhyalinis praeditis; rhachi dense patenti-villosa; foliolis subsessilibus vel brevissime petiolulatis, profunde bipartitis; segmentis crassiusculis, convexiusculis, lanceolatis, apice obtusis, basi abrupte angustatis acutisque, supra glabris, subtus villosis; pedunculo (in specimine typico 3 mm. longo) ac flore extus villosis; calycis segmentis circiter 2 mm. longis, exterioribus anguste ovatis, obtusis, interioribus subtriangularibus, acutis; petalis 3 mm. longis, obovato-oblongis, non retusis; staminibus 5; carpellis pluribus, stylo laterali circiter 0.6 mm. longo.

Netherlands New Guinea: Lake Habbema, *Brass 9594A* (type), August 1938, alt. 3225 m., alpine grassland.

When glancing through the duplicate specimens of *Potentilla habbemana* to get an idea of the variation in size, we found a single plant with one fully developed flower, which, although of similar habit, seemed not to belong to the series. On closer examination we find the leaflets divided only once, the entire segments so placed as to appear (superficially at least) verticillate; further, the segments seem to be somewhat fleshy or thickish in texture, slightly convex and often with the midrib (on the upper surface) apparent only in the lower half. The species is near *P. habbemana* but surely quite distinct in foliar characters.

Potentilla novoguineensis sp. nov.

Caudex parum vel modice incrassatus, inter numerosa folia radicalia caules plures laterales emittens; foliis radicalibus et caulinis inferioribus breviter petiolatis, interrupte pinnatis, multijugis (10–15-jugis), foliolis sessilibus vel subsessilibus deorsum decrescentibus, superioribus 1–1.3 cm. longis, oblongis (pinnulis interpositis minoribus, 2–5 mm. longis), inferioribus 2–4 mm. longis, crenato-inciso-dentatis, utrinque sparse

hirsutis vel supra glabrescentibus; stipulis ± villoso-hirsutis, foliorum radicalium et caulinarium inferiorum membranaceo-subhyalinis, caulinarium superiorum herbaceis, subvaginantibus, dentatis vel incisis; caulibus gracilibus, decumbentibus, ramosis, polyphyllis; ramis foliosis 2–3 flores solitarios (interdum geminatos) laterales et unicum terminalem gerentibus; caulibus, rhachibus, pedunculis, pedicellis, calycibus pilis mollibus patentibus villoso-hirsutis; floribus 0.9–1.3 cm. latis; calycis segmentis 8–10, exterioribus 2–2.5 mm. longis, obovato-oblongis, plerumque apice subtruncatis bidenticulatisque (interdum trilobatis), interioribus 3 mm. longis, anguste ovatis, acutis; petalis 4–5 mm. longis, vix retusis; staminibus probabiliter 10–20 (in floribus dissectis 11–15); carpellis numerosis, stylo laterali (infra medium carpellum locato); carpellis maturis interdum paullo reticulatis.

NETHERLANDS NEW GUINEA: 9 km. northeast of Lake Habbema, *Brass 10727* (TYPE), October 1938, alt. 2800 m., prostrate on native clearings in the forest; 7 km. northeast of Wilhemina-top, *Brass & Myer-Drees 9863,* September 1938, alt. 3560 m., prostrate herb gregarious in shaded mossy edge of forest. BRITISH NEW GUINEA: Central Division, Wharton Range, Murray Pass, *Brass 4636,* June–September 1933, alt. 2840 m., fairly plentiful on creek-banks and other damp situations on open grasslands (leaf rachis and peduncles red; flowers yellow); Mount Albert Edward, *Brass 4229,* May–July 1933, alt. 3680 m., common, prostrate pale green plant of forest glades (flowers bright yellow).

On comparing these collections with the Indian specimens at hand, we find the Papuan material has a habit similar to that of *Potentilla Mooniana* Wight (*P. polyphylla* Lehm.?), but it is not so robust and is somewhat more compact; the leaves and the flowers are smaller than in *P. Mooniana* Wight, and the styles are short-filiform (as in the LEPTOSTYLAE) rather than fusiform (subsection CLOSTEROSTYLAE); they do, however, appear to be placed a little nearer the base than those of the other members of this group, although the position appears somewhat variable.

Brass 9394, 5 miles northeast of Wilhemina-top, 3440 m. alt., under banks of a grassland stream, may or may not belong here. This is a single specimen about 35 cm. tall (seemingly upright), sparsely hirsute, with leaves very much like those of the Bornean *P. parvula* Hook. f. (the leaflets broadly elliptic and less dentate or incised than in *P. novoguineensis*) but with flowers (old) closely resembling those of *P. novoguineensis.* The long flowering stems (with 2–3 leaves) branch only near the apex.

Potentilla Foersteriana Lauterb. var. **Keysseri** Diels, Bot. Jahrb. **62:** 480. 1929.

Northeastern New Guinea: Sarawaket, *Clemens 5317, 5765.* British New Guinea: Central Division, Mount Albert Edward, *Brass 4419* in part, *4231,* alt. 3680 m., common on wet alpine grasslands (leaves and flowering stems radiating from a stout woody stock). Type from Mount Sarawaket.

These collections have leaves glabrous on the upper surface (and sometimes on the lower), with leaflets varying in size and in dentation (3–12-incised-dentate).

The following three collections from Netherlands New Guinea appear to differ only in that the leaflets tend to remain sparsely villous or copiously pilose throughout: Lake Habbema, *Brass 9149,* alt. 3225 m., alpine grassland, prominent in succession after ground fires; *Brass 9542,* abundant in raised cushion-like masses on open boggy flats; 2 km. east of Wilhemina-top, *Brass & Myer-Drees 10131,* alt. 3800 m., scattered or forming large cushions on wet grass slopes.

Regardless of the difference in the amount of pubescence we accept these collections as belonging to the same entity; and, we are inclined to agree with Dr. L. Diels that they are distinct from, though closely related to, *Potentilla parvula* Stapf, of Borneo. The Papuan plants (as compared with a specimen from Mount Kinabalu, Borneo) are coarser and much more compact with more crowded leaflets, and the flowers have mostly 5 stamens (occasionally 6 or even ten).

Potentilla papuana Focke, Abhandl. Naturw.-Ver. Bremen **13:** 162. 1894, Bibl. Bot. **16:** 678. 1908; van Steenis, Bull. Jard. Bot. Buitenz. III. **13:** 243. 1934.

Netherlands New Guinea: Lake Habbema, *Brass 9543,* alt. 3225 m., gregarious and forming large gray patches in grassy forest glades; 11 km. northeast of Wilhemina-top, *Brass & Myer-Drees 9746,* alt. 3400 m., in wet grassy valley. British New Guinea: Central Division, Mount Albert Edward, *Brass 4230,* alt. 3680 m., common on grasslands; Wharton Range, Murray Pass, *Brass 4635,* alt. 2840 m., common in sheltered situations on open grasslands.

Although assigning this name to our material, we leave to others, who have access to the types, the task of finally determining whether *Potentilla papuana* Focke is really a species distinct from *P. leuconota* Don, or whether it is only a geographic form. Although lacking types, we have at hand Indian material of the latter species collected and cited

by Hooker f.* as well as supplementary collections from China which undoubtedly match the Indian material; also a poor specimen of *P. leuconota* var. *borneensis* Stapf from Mount Kinabalu. The Papuan specimens show some resemblance to the Bornean plant but appear to be definitely distinct from our Indian and Chinese collections.

Potentilla adinophylla sp. nov.

Caudex subterraneus crassiusculus, coma foliorum atque caulium floriferorum fere scapiformium terminatus; foliis basalibus confertis, imparipinnatis, ± 12-jugis, usque 4 cm. longis, 8 mm. latis, oblongis, breviter petiolatis; stipulis subhyalinis; foliolis parvis (4 mm. longis), dense confertis, inferioribus gradatim minoribus, sessilibus, interdum subconduplicativis, obscure inciso-dentatis, dense villosis; caulibus floriferis fere scapiformibus, usque 9 cm. longis, saepissime erectis, saepe 1–2-foliatis, interdum ramulo florigero unico auctis, villoso-tomentosis; floribus maturis villoso-tomentosis; calycis segmentis ± 2.5 mm. longis, anguste ovatis, exterioribus obtusiusculis, interioribus acutis; staminibus 10; carpellis numerosis; stylo laterali 0.8 mm. longo; carpellis maturis glabris.

BRITISH NEW GUINEA: Central Division, Mount Albert Edward, *Brass 4308* (TYPE), May–July 1933, alt. 3680 m., common on shallow soil on bleak, open grasslands (leaves silver-grey; inflorescence erect).

Potentilla adinophylla undoubtedly belongs in the same group as *P. papuana* Focke and *P. Foersteriana* var. *Keysseri* Diels. It may be readily recognized, however, by the erect almost scapose habit, the dense arrangement of the leaflets and their villosity.

ACAENA Vahl

Acaena anserinifolia (Forst.) Domin, Bibl. Bot. **22**: 718. 1925; van Steenis, Bull. Jard. Bot. Buitenz. III. **13**: 241. 1934.

Ancistrum anserinaefolium Forst. Char. Gen. 4, *t. 2*. 1776.
Acaena Sanguisorbae Vahl, Enum. **1**: 294. 1805.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass 9137*, alt. 3225 m., plentiful in grassy edges of forest (flowers white). NORTH-EASTERN NEW GUINEA: Sarawaket, *Clemens 5292, 5716*, alt. 2400–2700 m. BRITISH NEW GUINEA: Central Division, Mount Albert Edward, *Brass 4330*, alt. 3680 m., growing thickly amongst grasses on recently burned forest land.

Diels (Bot. Jahrb. **62**: 482. 1929), has recognized the Papuan material as *Acaena Sanguisorbae* Vahl subsp. *papuana* Diels. We merely record these collections under the oldest valid specific name.

*Hooker f. Fl. Brit. Ind. **2**: 352. 1878.

Pygeum Gaertner

Eighteen species of *Pygeum* have been reported from the Papuasian region. Of these, only one has appeared since Koehne's treatment, Bot. Jahrb. **51**: 208–211. 1913; **52**: 338–345. 1915. With merely the original descriptions for comparison, and with the difficulty of trying to match fruiting specimens with diagnoses of staminate plants, in addition to the question of whether immature pubescent seeds remain pubescent or are sometimes glabrous at maturity (the pubescent seed being a sectional character), we have not found it easy to determine our material. In view of the lack of recent records, and as a working basis for collections about to be or already distributed, we present the following enumeration:

Pygeum Laurocerasus Koehne, Bot. Jahrb. **51**: 208, 214. 1913.

British New Guinea: Central Division, Mount Tafa, *Brass 4884*, alt. 2400 m., on upper fringe of vegetation on a landslip (large diffuse shrub; flowers brown-pubescent; immature fruit yellow-green, about 1.3–1.4 cm. diameter). Reported only from the type-locality, Bismarck Mountain, Northeastern New Guinea.

Only one fruit on the specimen examined. Foliar glands minute, if present.

Pygeum Pullei Koehne, Bot. Jahrb. **52**: 338, 344. 1915.

Netherlands New Guinea: 7 and 11 km. northeast of Wilhelmina-top, *Brass & Myer-Drees 9995, 9647*, alt. 3560 m. and 3400 m., subalpine forest, occasional (trees 8–10–15 m. high, trunk 2 m. long, 25 cm. diameter; leaves convex; flowers yellow; fruit black, glossy). Known only from the type-locality.

Since the two collections cited above agree in the essential features (general habit, leaf-venation, inflorescence-characters) with the original diagnosis (indumentum of the leaves omitted in the description) of *Pygeum Pullei* Koehne, we have placed them here noting that they vary in the following points: new growth very shortly tomentose or only pubescent and very quickly glabrate; leaves somewhat larger (4–8 cm. long, 2–4 cm. broad) and rounded-emarginate at the apex (a large number of the apices broken but only a few at all narrowed); fruiting axis of the inflorescence up to 3.5 cm. long; pedicels 1–2 (scarcely 3, even in fruit) mm. long; stamens (in bud) about 25, and anthers 0.8–1 mm. long.

Pygeum melanocarpum sp. nov. § *Mesopygeum*.

Arbor 8–10 m. alta; ramulis puberulis, fuscis; stipulis caducis; petiolo 8–10 mm. longo, glabro vel puberulo; lamina basi obtusa vel acuta vix

rotundata et subtus glandulis plerumque 2 praedita (accessoriis in superiore facie nullis), late lanceolata vel anguste elliptica, 5.5–10.5 cm. longa, 2.5–4 (–6) cm. lata, glabra vel novella subtus minute puberula, apice abrupte obtuseque acuminata, vulgo abrupte reflexa, nervis utrinsecus 6–8, supra impressis subtus prominulis, trabeculis reticuloque ± inconspicuis; racemis axillaribus, solitariis, 3.5–7 cm. longis, dense ochraceo-pubescentibus; bracteis ± lineari-oblongis, ante anthesin caducis; pedicellis 3–5(–8) mm. longis; floribus albis, in sicco ochraceo-pubescentibus; cupula turbinata, 3 mm. longa, 4 mm. lata, intus inferiore parte hirsuta; sepalis 5, ± 1 mm. longis, oblongis; petalis spathulato-oblongis vel fere spathulato-linearibus, quam sepalis paullo longioribus; staminibus 25, circiter 4 mm. longis; filamentis glabris; antheris 0.5 mm. longis; pistillo 5 mm. longo, ovario 1 mm. longo, glabro; drupis transverse ellipsoideis, 7–9 mm. latis, 6–7 mm. longis, ± reticulatis; semine glabro.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, *Brass 11531, 11532* (TYPE), alt. 2400 m., plentiful in forest substage (tree 8–10 m. high; flowers white; ripe fruit black, fleshy); 9 km. northeast of Lake Habbema, *Brass & Versteegh 10480,* alt. ± 2650 m., rare in forest substage (tree 25 m. high, 28 cm. diameter; bark gray-brown, fairly smooth; flower-buds white; young fruit green, ripe fruit violet).

In addition to the above we place here tentatively the following collection: *Brass & Versteegh 10467,* 9 km. northeast of Lake Habbema, ± 2750 m. alt., frequent (tree 31 m. high, 39 cm. diameter; bark black-brown; the outer wood light brown, the inner red-brown; young fruit green). This specimen differs from the rest in having drupes 10–11 mm. broad, 7 mm. high, in cupules 5–6 mm. diameter. In the type the remnant of the calyx-tube has a diameter of about 3 mm. Further, in *Brass & Versteegh 10467* most of the fruiting racemes tend to be below the leaves, although occasional ones appear on recent growth.

Pygeum melanocarpum falls very close to both *P. papuanum* Hemsl. and *P. brevistilum* K. Schum. It is easily separable from both by its smaller and obtusely acuminate leaves. It may also be distinguished from the first by its shorter inflorescence, and from the second by the almost complete lack of pubescence except on the inflorescence; the ovary is much shorter in proportion to the length of the style, and the drupe is a little smaller than in the latter. Koehne, in his key to the sections of *Pygeum,* Bot. Jahrb. **51**: 216. 1913, placed *P. brevistilum* K. Schum. under "ovarium pilosum."

Pygeum costatum Hemsl. Kew Bull. **1899:** 98. 1899; Koehne, Bot. Jahrb. **51:** 209, 217. 1913; **52:** 339, 344. 1915.

British New Guinea: Central Division, Mount Albert Edward, *Brass 4221*, alt. 3680 m., common in forest, forest borders, and fringes of glades (low tree 3–6 m.; stiff and often flat-branching; petiole and underside of midrib pale yellow-green; fls. white; fruit smooth, green). Type-collection from Mount Scratchley; reported also from Mount Wichmann.

The seed in this collection is practically glabrous; a few minute sericeous hairs are still present and the inside of the putamen is very sparingly sericeous. Possibly this condition would not have been present if the fruit had been fully mature.

Pygeum rigidum Koehne, Bot. Jahrb. **52:** 339, 344. 1915.

Netherlands New Guinea: 9 km. northeast of Lake Habbema, *Brass 10844*, alt. 2600 m., common in forest undergrowth (tree 3 m. high; leaf-nerves more prominent on the upper surface; flowers white); *Brass & Versteegh 10471*, alt. ± 2750 m., rare in mossy forest (tree 21 m. high, 30 cm. diameter; bark black, rough; outer wood brown-yellow, inner red-brown); Bele River, 18 km. northeast of Lake Habbema, *Brass 11315*, alt. 2200 m., forest substage (tree 10 m. high; fruit black, fleshy); Balim River, *Brass & Versteegh 11179*, alt. 2150 m., low open forest on sandy slope (tree 11 m. high; flower-buds light green).

Although these specimens show some variation from each other as well as from the original description of *Pygeum rigidum* Koehne, it has seemed best to place them here until type-material is available for comparison. The leaves are 6–14 cm. long, 2.5–6.5 cm. wide, with the venation in some specimens very obvious, in others inconspicuous. The inflorescences of *Brass 10844* and *Brass & Versteegh 11179* seem not to vary greatly. In the first the inflorescence is 7–15 cm. long, minutely pubescent becoming glabrous with age; calyx-tube about 3 mm. long, glabrous within except at the base; sepals 5, 2 mm. long, narrowly triangular, obtusish; petals 5, 2 mm. long, ovate-oblong, obtuse; stamens about 30, anthers oblong, 1 mm. long; pistil 3.5 mm. long, ovary 1 mm. long, glabrous. The flowers of the second scarcely differ; they are slightly smaller, the sepals and petals tend to be somewhat irregular and sometimes occur in 6's.

Brass & Versteegh 10471 and *Brass 11315* are fruiting specimens. The former has immature smooth fruit with a finely pubescent seed which, we suspect, becomes glabrous at maturity; the vegetative characters match those of *Brass 10844* reasonably well. The second collection has mature fruit obviously reticulate and a glabrous seed. The lenticel-character, stressed in Koehne's description, which seems charac-

teristic of the other material discussed under this species, is not markedly a feature of this particular number. All these specimens ought to be compared also with *E. papuanum* Hemsl.

Perhaps not belonging to this species, but surely closely related, is another collection, *Brass & Versteegh 11952*, 15 km. southwest of Bernhard Camp, Idenburg River, rare on ridges in the primary forest, at 1900 m. alt. (tree 22 m. high, 33 cm. diameter; ripe fruit dark red). The leaves on the whole are smaller (4–8.5 cm. × 2–4 cm.), but it would not be easy to distinguish the largest ones from this species; the fruiting pedicel is 1 cm. long, the immature fruit is 10 mm. long, 13 mm. broad, and the young seed is pubescent (no mature fruit found).

Pygeum dolichobotrys Lauterb. & K. Schum. in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 340. 1900, Nachtr. 274. 1905; Koehne, Bot. Jahrb. **51**: 210, 211, 217. 1913; Diels, Bot. Jahrb. **57**: 427. 1922.

Combretum flavo-virens Lauterb. Nov. Guin. **8**(4): 847. 1912.

British New Guinea: Palmer River, 2 miles below Black River Junction, *Brass 7308*, alt. 100 m., common in ridge-forest canopy layer (tree ± 25 m.; trunk prominently and narrowly spur-buttressed; bark brown; wood pale, soft; flowers white, in numerous racemes axillary on short lateral branches; fruit white). Type from Northeastern New Guinea; also reported from Netherlands New Guinea and New Mecklenburg.

Our specimen has flowers with 25 stamens (in *Combretum flavovirens* Lauterb. which [fide Diels, l.c.] belongs to this species, the number of stamens is given as 10), and the base of the calyx-tube within is only sparsely hirsute around the base of the ovary.

Pygeum pilinospermum Koehne, Bot. Jahrb. **52**: 342, 345. 1915.

British New Guinea: Middle Fly River, Lake Daviumbu, *Brass 7858*, substage tree of the rain-forest (bark brown, peeling in hard thin curled flakes; fruit white, immature). Type from Northeastern New Guinea. Endemic.

Possibly this species is also represented by the sterile collection, *Brass & Versteegh 13600*, Bernhard Camp, Idenburg River, 175 m. alt., frequent in primary rain-forest (tree 20 m. high, 39 cm. diameter; bark black; wood dark red-brown).

Pygeum platyphyllum K. Schum. in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee Nachtr. 273. 1905; Koehne, Bot. Jahrb. **51**: 211, 219. 1913.

British New Guinea: Central Division, Mafulu, *Brass 5292*, alt.

1250 m., lower primary forest (pendent racemes of cream-colored flowers, ♂). NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 13137*, alt. 800 m., occasional in primary rain-forest of flood plain (tree 31 m. high, 52 cm. diameter; fls. white ♀, young fruit white, black when ripe). NORTHEASTERN NEW GUINEA: Sattelberg, *Clemens 146, 3204*, alt. ± 1000 m.; Yunzaing, *Clemens 6523A*, alt. ± 1500 m.

Our material closely resembles the Clemens collection from Sattelberg, the type-locality of this Papuan species. Staminate flowers subsessile or short-pedicellate, densely short-tomentose; calyx-tube hirsute within; stamens ± 25; pistil very short (1.5 mm. long), almost hidden in the pubescence surrounding it. Pistillate flowers (in bud) on pedicels 3 mm. long; ovary glabrous (rather than sparsely pilose as in Koehne's key to the subsection); mature fruit with minute ridges following the main branches of the reticulation of the putamen.

Pygeum retusum sp. nov. § *Sericospermum*.

Arbor humilis vel frutex, inflorescentia excepta glaberrimus; ramulis hornotinis fuscis, vetustioribus cinereis; stipulis caducis; petiolo 6–10 mm. longo; glandulis subtus juxta basim costae 4 vel interdum 2, accessoriis in superiore facie nullis; lamina e basi rotundata vel obtusa vel gradatim angustata elliptica, 3.5–6.5 cm. longa, 1.8–3.5 cm. lata, apice obtusa vel retusa vel emarginata; nervis utrinsecus 7–10 supra tenuiter impressis subtus prominulis, trabeculis reticuloque inconspicuis; racemis axillaribus, solitariis, 3.5–7 cm. longis, minute parceque pubescentibus dein glabratis; bracteis ante anthesin caducis; pedicellis 2.5–4 mm. longis; cupula turbinata, 2 mm. longa, 3 mm. lata, intus imo fundo tantum parce hirsuta; sepalis 5, obtuse triangularibus, circiter 1 mm. longis; petalis 5, ± 1.5 mm. longis, oblongis; staminibus ± 20, 3–3.5 mm. longis; filamentis glabris, antheris ± ovatis, 0.6 mm. longis; pistillo 4 mm. longo, ovario glabro; drupis transverse ellipsoideis, 7 mm. longis, 10 mm. latis, glaberrimis; putamine reticulato; semine dense pubescente.

NETHERLANDS NEW GUINEA: Lake Habbema, *Brass 9035* (TYPE, fl. and fr.), alt. 3225 m., plentiful in mossy thickets of ridges (low gnarled tree ± 2 m. high; flowers dirty white, inconspicuous; fruit red); *Brass 9103*, alt. 3225 m., plentiful as a low tree or shrub on peaty ridges (flowers white); *Brass & Myer-Drees 10428, 10439*, at 3225 m. alt. (trees 8–9 m. high, 24–30 cm. diameter).

In general appearance this species suggests *Pygeum costatum* Hemsl. but has much smaller flowers and a densely pubescent seed.

A specimen superficially very like *P. retusum* is *Brass & Versteegh 10454*, 9 km. northeast of Lake Habbema, 2860 m. alt., common in

mossy forest (tree 19 m. high, 27 cm. diameter; bark dark brown, scaly; fruit green). It differs in that the young fruit has the immature seed and the inside of the putamen only sparsely pubescent. This, and the practically glabrous condition of the almost mature seed of *P. costatum* Hemsl. leads us to suspect this seed too will be practically glabrous at maturity. In *P. retusum,* on the other hand, the seed is densely pubescent both in the young and the nearly mature fruit. Possibly this number (*Brass & Versteegh 10454*) ought to be allied with *P. costatum* Hemsl.; yet it is readily separable from this by the somewhat more tapering base and ± acutish apex of the leaves, and the shorter and more slender fruiting axes. Unfortunately the inflorescence is too immature to be of value diagnostically. Further material may prove it to be a good species.

Pygeum Schlechteri Koehne, Bot. Jahrb. **51:** 210, 217. 1913; **52:** 344, 345. 1915.

SOLOMON ISLANDS: Malaita, Quoimonapu, *Kajewski 2383,* at 300 m. alt., common in rain-forest on mountain-slopes (very large tree up to 30 m. high; fruit cream-colored when ripe, 1.5 cm. long, 1.8 cm. diameter); Guadalcanal Island, Ma Massa, Konga, *Kajewski 2483,* at 400 m. alt., common in rain-forest (medium-sized tree up to 20 m. high; fruit black-plum color, 1.4 cm. long, 1.3 cm. diameter; Uulolo, Tutuve Mountain, *Kajewski 2581,* alt. 1200 m., common in rain-forest (tree up to 15 m. high; fruit black when ripe, 1.4 cm. long, 1.8 cm. diameter).

Pygeum Schlechteri Koehne, hitherto known only from Northeastern New Guinea, was based on a specimen from a staminate tree. These three collections (in fruit) from the Solomon Islands agree so well with the vegetative characters given in the description of this species that we have determined them as such and here append a short description of the fruiting parts: inflorescence on last year's or this year's growth; axes of the racemes (3–8 cm. long), also pedicels (about 4 mm. long) and remnants of the calyx-tube (early deciduous or very narrow) densely hirtellous-tomentose, tawny; young drupes ovoid, pubescent, mature ones glabrate, transversely oblong, somewhat obtusish at the apex; seed-coat sericeous to glabrate.

Kajewski noted that nos. *2483* and *2581* are similar to a species occurring in Northern Queensland. Although the general habit of these collections suggests *Pygeum Turnerianum* F. M. Bail., the fruit of the latter is very much larger than that shown in the specimens from the Solomon Islands.

Pygeum salomonense sp. nov.

Arbor 6 m. alta; ramis laevibus, fuscis; ramulis fuscis, glabris, novellis

minute rufo-tomentosis, cito glabratis; stipulis in ramulorum apice locatis lineari-lanceolatis (6 mm. longis), pubescentibus, ceteris caducis; petiolo 1 cm. longo, minute pubescente; glandulis basalibus 4, minimis; secundariis nullis; lamina e basi fere rotundata vel subacuta elliptica, 17–23 cm. longa, 9–10 cm. lata, apice acuminata, novella adpresse pubescente vel praesertim subtus tomentosa, cito glabra, adulta glabra, subtus in costa nervisque minute pubescente ceterum glabra; nervis utrinsecus 10–12, supra tenuiter impressis, subtus prominulis, trabeculis undique parum prominulis, reticulo inconspicuo; racemis solitariis, axillaribus vel infra folia dispositis, 3–5 cm. longis, dense ochraceo-pubescentibus; axi gracillimo, 0.5 mm. diametro; bracteis lanceolatis, 2 mm. longis, interdum ad anthesin persistentibus; pedicellis 2 mm. longis; cupula subturbinata, 2–2.5 mm. longa, 3 mm. lata, intus imo fundo tantum hirta; sepalis petalisque ± linearibus, ± 1 mm. longis; staminibus circiter 30, antheris 0.6–0.8 mm. longis; pistillo ignoto.

Solomon Islands: San Cristobal Island, Magoha River, *Brass 2727* (type), August 25, 1932, at 50 m. alt., in riverbank rain-forest (tree 6 m. high with spreading top and smooth dark brown branches; leaves thin, dark, margins slightly recurved; flowers yellowish brown in color).

This collection suggests *Pygeum Schlechteri* Koehne but may be distinguished from the latter by the much larger leaves and the scanty pubescence of the vegetative parts.

Pygeum spec.

Netherlands New Guinea: 2 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 13187*, 750 m. alt., frequent in primary rain-forest on slopes (tree 30 m. high; fruit red).

This collection appears to be near *Pygeum dolichobotrys* Laut. & K. Schum. and *P. Forbesii* Koehne. It is a glabrous plant with very brittle leaves 9–13.5 cm. long, 4–7 cm. broad, ± 8-nerved; racemes up to 8 cm. long; drupes 15 mm. broad, 11 cm. high, glabrous with a glabrous seed. In the very young fruits one finds the ovary glabrous along with a minutely and sparsely pubescent remnant of the calyx-tube.

Parastemon A. DC.

? **Parastemon Versteeghii** sp. nov.

Arbor ± 34 m. alta, trunco ± 44 cm. diametro; ramulis novellis gracilibus puberulis vel glabris; foliis alternis, membranaceo-subcoriaceis, glabris, integris, lanceolatis ad lanceolato-ellipticis, 6–9 cm. longis, 1.5–3.2 cm. latis, basi in petiolum brevem (2–3 mm. longum) angustatis, apice obtuse acuminatis (acumine ± 0.7–1.3 cm. longo), nervis laterali-

bus utrinque 5–8 ante marginem arcuatis; stipulis minutis(?), caducis; racemis 4–5 cm. longis, axillaribus, folio brevioribus, puberulis vel minute pubescentibus; pedicellis 3–5 mm. longis; floribus parvis (circiter 3 mm. longis), albis; calycis tubo 1 mm. longo, intus pubescente, segmentis 5, ± 2 mm. longis, oblongis, ciliatis, sparse pubescentibus; petalis vix sepalis longioribus, ciliatis, extus sparse pubescentibus; staminibus (omnibus perfectis) 5, antisepalis, margine calycis tubi insertis; filamentis quam sepalis paullo brevioribus; ovario rotundato, 1 mm. diametro, 1-loculari; ovulis 2, a basi loculi collateraliter ascendentibus, minute pubescentibus; stylo basilari basi dense pubescente; stigmate bilobo (interdum cruribus recurvis inaequalibus); fructu (immaturo tantum) 1.2 cm. longo, oblongo, basi angustato et paullo obliquo, glabro.

NETHERLANDS NEW GUINEA: Bernhard Camp, Idenburg River, *Brass & Versteegh 13544* (TYPE), April 1939, alt. 100 m., frequent in primary rain-forest on the lower mountain slopes (tree 34 m. high, 44 cm. diameter, with thick black scaly bark and white flowers); 2 km. southwest of Bernhard Camp, Idenburg River, *Brass & Versteegh 13515*, March 1939, alt. 750 m., frequent tree of the primary rain-forest (28 m. high, 60 cm. diameter, with thick black scaly bark — sterile specimen).

This plant undoubtedly belongs to the CHRYSOBALANEAE of the Rosaceae, and it appears to be more nearly related to *Angelesia* and *Parastemon* than to any other members of this group in the Malaysian region. As these genera have been defined, we believe it to be closer to *Parastemon* than to *Angelesia*, differing from the latter in having a basal style with a two-lobed stigma rather than a lateral one with a capitate stigma, a pericarp glabrous within rather than hairy, and only 5 stamens. *Parastemon* is usually defined as a plant with polygamo-dioecious flowers in which are two perfect stamens, the other three being rudimentary. The Papuan material differs in having perfect flowers with 5 fertile stamens and no rudimentary ones; nevertheless, the general aspect of the plant, the shape of the fruit (immature only), the basal style, and the pubescent ovules all agree with the characters of the genus *Parastemon*. Since, in the Rosaceae, the androecium shows much variability, for the present at least we have assigned these collections to *Parastemon*.

MELASTOMATACEAE

(FR. MARKGRAF)

Medinilla nidularis Markgraf sp. nov.

Fruticulus humilis epiphyticus glaber. Truncus abbreviatus. Folia opposita carnosa sessilia obovato-elliptica septuplinervia scabridula

glabra, apice acuminata, basi auriculata et collo stipulari foliaceo coniuncta, usque ad 20 cm. longa et 9 cm. lata. Inflorescentiae cymosae fasciculatae axillares, saepe cauliflorae. Flores tetrameri. Pedicelli 3–5 mm. longi. Bracteolae conspicuae lineares, 2 mm. longae. Calyx octo-costatus obconicus, basi truncatus, apice minute quadridentatus. Petala late semicircularia, breviter apiculata. Stamina 8 aequalia; filamenta brevissima; antherae acuminatae; connectivum basi antice minute bicuspidatum, postice obscure alatum, ala in calcar basale obtusum brevissimum protracta. Stylus brevis; stigma obscurum capitatum; ovarium glabrum quadriloculare multiovulatum, calyci plane accretum. Fructus baccati rubri globosi polyspermi, 4 mm. crassi. Semina nitida obconica.

British New Guinea: Fly River Region, Palmer River, 2 miles below junction of Black River, epiphytic trunks, 100 m. above sea level, uncommon; flowering and fruiting, July 1936, *L. J. Brass 7057*, TYPE in the Arnold Arboretum.

APOCYNACEAE

(Fr. Markgraf)

Excavatia minima Markgraf sp. nov.

Arbuscula gracillima fruticosa glabra, 3–4 m. alta. Ramuli graciles teretes. Folia ternata vel opposita, chartacea; petiolus 1 cm. longus; lamina obovato-cuneata, ad 9 cm. longa et 3.5 cm. lata, in petiolum longe angustata; nervi secundarii recti, angulo paene recto a costa oriundi, nervo marginali inter se coniuncti. Inflorescentiae in apicibus ramulorum axillares pauciflorae cymosae; pedunculus communis 5–6 cm. longus. Flores subsessiles, minute bracteati et bracteolati; lobi calycis ovati, quincunxiales, apice lacerati, intus glandulosi, 2 mm. longi, 1 mm. lati; tubus corollae 8 mm. longus, 1 mm. latus, infra faucem inflatus, in fauce constrictus; lobi oblongi, 6 mm. longi, 2 mm. lati, dextrorsum tecti, in basi sinistra auriculati; antherae ovatae, 1 mm. longae, filamentis brevibus infra faucem insertae. Stigma antheras vix attingens, e basi globosa conicum, biapiculatum. Stylus 5 mm. longus, a basi ad 2 mm. longitudinis bifidus. Ovarium conspicue apocarpum, biloculare, 1 mm. altum, in placenta valde prominula biovulatum. Fructus rubri, apocarpi. Mericarpium carnosum, ellipsoideum, marginatum, brevissime apiculatum, 1.5 cm. longum, 1 cm. latum, 8 mm. altum; exocarpium 1 mm. crassum, excavationes mesocarpii 3 mm. latae, 5 mm. longae, 12 mm. altae, endocarpium ligneum, tenue. Semen unicum, ellipticum, planum, 8 mm. longum, 5 mm. latum, 1 mm. crassum. Embryo 1.5 mm. longus, 0.5 mm. crassus.

BRITISH NEW GUINEA: Western Division, Tarara, Wassi Kussa River, common in undergrowth of rain-forest, flowering and fruiting, December 1936, *L. J. Brass 8512*, TYPE in the Berlin Herbarium, ISOTYPE at the Arnold Arboretum.

EXPLANATION OF PLATE I

Photographs of fruit-heads taken in the field by Mr. L. J. Brass.

Sketches of drupes and phalanges natural size.

Fig. 1. *Pandanus brachyphyllus* Merr. & Perry. Syncarp.
Fig. 2. *The same.* Phalange in profile.
Fig. 3. *The same.* Phalange in longitudinal section.
Fig. 4. *The same.* Phalange from above.
Fig. 5. *Pandanus adinobotrys* Merr. & Perry. Syncarp.
Figs. 6, 7. *The same.* Drupes in profile.
Fig. 8. *The same.* Drupe in longitudinal section.
Fig. 9. *Pandanus atropurpureus* Merr. & Perry. Infructescence (spike of syncarps).
Fig. 10. *The same.* Drupes in profile.
Fig. 11. *The same.* Drupes from above.
Fig. 12. *Pandanus brosimos* Merr. & Perry. Syncarp.
Figs. 13, 14. *The same.* Drupes in profile (from two different angles).
Fig. 15. *The same.* Drupe in longitudinal section.
Fig. 16. *Pandanus concinnus* Merr. & Perry. Syncarp.
Fig. 17. *The same.* Drupes in profile.
Fig. 18. *Pandanus penicillus* Martelli. Syncarp.
Fig. 19. *Pandanus dolichopodus* Merr. & Perry. Phalange in profile.
Fig. 20. *The same.* Phalange from above.
Fig. 21. *The same.* Phalange in longitudinal section.
Fig. 22. *Pandanus leptocaulis* Merr. & Perry. Cluster of drupes in profile.
Fig. 23. *The same.* Cluster of drupes from above.
Fig. 24. *The same.* Drupe in longitudinal section.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

Plantae Papuanae Archboldianae

FULL-TONE — MERIDEN

A MONOGRAPH OF THE GENUS SYMPHORICARPOS

GEORGE NEVILLE JONES

THE FIRST synoptical revision of *Symphoricarpos* was written by Asa Gray more than sixty years ago. At that time only eight species were known; since then nine additional species have been discovered. Inevitably, there has been the usual accretion in the bibliography and synonymy in this genus, and the confusion that consequently exists concerning the identity, specific limits, nomenclature, and geographical distribution of the species seems to warrant the presentation of the following monographic study. The objectives in this paper are, therefore, to present a taxonomic treatment including keys and descriptions of the species, with attention to their probable phylogeny and biogeographical affinities, and to give fairly complete accounts of the bibliography and synonymy.

Symphoricarpos is a genus of ligneous plants belonging to the Caprifoliaceae, containing sixteen known species in North America, and one in central China. The generic name is of Greek origin, *symphorein*, to bear together, and *karpos*, fruit, referring to the clustered drupes. Several species are grown for their attractive fruits and are cultivated under the names snowberry, waxberry, wolfberry, or coralberry. Many of the species are very closely related and therefore difficult to distinguish. Several are important browse plants in western United States.

The generic concept of *Symphoricarpos* was established in 1732 by Dillenius upon the plant we now call *S. orbiculatus* Moench, and was validated nomenclaturally by Duhamel du Monceau in 1755. The genus is evidently closely related to *Lonicera*, in which it was included by Linnaeus. However, *Lonicera* is entirely distinct in its mostly irregular and bilabiate gibbous corolla, and by the locules of the ovary being all fertile and 2–many-ovuled; its fruit is a few–several-seeded berry.

The important structural characters used in the classification of the species of *Symphoricarpos* are to be found in the flowers and fruits, particularly the shape and size of the corolla, the relative length of the lobes and the tube, as well as the size of the anthers and their length in relation to the free portion of the filament and the lobes of the corolla. The character of the style, whether glabrous or pubescent, or long or short, is a valuable and significant taxonomic criterion for most of the

species. Luckily, *Symphoricarpos* shows no evidence of dimorphism or heterostyly. This fact has been already attested by Asa Gray. The color, shape, and size of the drupe and nutlets are characters of the greatest utility and phylogenetic value. The one species known from eastern Asia, *S. sinensis,* has black fruit. One of the North American species, *S. orbiculatus,* has red fruit; the others are white-fruited. The two nutlets are plano-convex, varying from oval to lanceolate and obtuse, or occasionally acute, according to the species. Vegetative structures, as a general rule, are of secondary value as phylogenetic characters. However, the habit of the plant, whether erect, or decumbent and trailing, affords a constant character. The foliage is notoriously variable in size, texture, indument, and margins. In nearly all the species the leaves of the young branches of the season are larger and frequently toothed or lobed. Occasional specimens with verticillate phyllotaxy may be found. In the key and descriptions on the following pages, the statements concerning the leaves refer to those of the flowering branches unless there is a statement to the contrary.

Since this is the first monographic survey of the subject, the bibliography has been made as nearly complete as possible. The intention throughout has been to achieve maximal uniformity of arrangement and facility of reference. To that end, only publications containing references to original or significant taxonomic data, or to illustrations, are cited. In the key to the species external and easily observed characters such as pubescence of twigs, shape of leaves, or habit of plant, have been used as much as possible. In most instances wherever these convenient characters are used, other characters, usually of flowers or fruits, have been inserted as additional guides to identity, as well as for the purpose of strengthening the key and indicating that the scheme of classification herein adopted rests chiefly upon characters of fundamental morphological importance.

During this investigation the study of herbarium specimens has been supplemented by living plants of several of the species in the field, as well as those available in the Arnold Arboretum. The herbarium specimens from most of the larger collections in the United States and Canada have been examined, making a total of approximately 6000 sheets. In citing specimens the abbreviations included in the following parentheses are used: (A) Arnold Arboretum, (P) Academy of Natural Sciences, Philadelphia, (Cal) California Academy of Sciences, (Can) National Museum of Canada, (F) Field Museum of Natural History, (UI) University of Illinois, (Mo) Missouri Botanical Garden, (NY) New York Botanical Garden, (UC) University of California, and (US) United

States National Herbarium. Due to the necessity for economizing space, only representative specimens are cited.

To the curators of the above-mentioned institutions who have kindly permitted the loan and use of the botanical specimens cited in the following pages, my thanks and gratitude are hereby expressed. Special thanks are due Professor Alfred Rehder for innumerable useful suggestions and criticisms; to Dr. E. D. Merrill for his co-operation in making the completion of this study possible; and to Miss Nell Horner of the Missouri Botanical Garden for bibliographical assistance.

Generic Synonymy and Description

Symphoricarpos [Dillenius, Hortus Eltham. 371. *pl. 278, f. 360.* 1732]; Duhamel, Traité des Arbres **2**: 295, *pl. 82.* 1755; Boehmer in Ludwig, Defin. Gen. Pl. (ed. 3) 35. 1760; Jussieu, Gen. Pl. 211. 1789; Moench, Meth. Pl. 502. 1794; Michx. Fl. Bor. Am. **1**: 103. 1803; Poiret in Lam. Encycl. Méth. Bot. **7**: 523. 1806; Willd. Enum. Pl. **1**: 221. 1809; HBK. Nov. Gen. Sp. **3**: 331. 1818 (as *Symphoricarpus*); Roemer & Schultes, Syst. Veg. **5**: xiv, 222. 1819; Torrey, Fl. N. & Middle Sect. U. S. **1**: 246. 1824; Eaton, Man. Bot. (ed. 5) 414. 1829; DeCandolle, Prodr. **4**: 338. 1830; Hook. Fl. Bor. Am. **1**: 284. 1833 (as *Symphoricarpus*); Loudon, Arb. Frut. Brit. **2**: 1059. 1838; Endlicher, Gen. Pl. 568. 1838 (as *Symphoricarpus*); Eaton & Wright, N. Am. Bot. 447. 1840; Torr. & Gray, Fl. N. Am. **2**: 4. 1841; Loudon, Encycl. Trees Shrubs 542. 1842; Gray, Man. Bot. N. U. S. 170. 1848, (ed. 2) 164. 1856; Koch, Dendrol. **2**: 47. 1872 (as *Symphoricarpus*); Bentham & Hooker, Gen. Pl. **2**: 4. 1873; Gray, Jour. Linn. Soc. **14**: 9. 1873 (as *Symphoricarpus*), Man. Bot. N. U. S. (ed. 5) 203. 1875, in Brewer & Watson, Bot. Calif. **1**: 279. 1880; Gray, Syn. Fl. 1^2: 13. 1886; Dippel, Handb. Laubholzk. **1**: 277. 1889; Watson & Coulter in Gray, Man. (ed. 6) 220. 1889; Fritsch in Engler & Prantl, Nat. Pflanzenf. IV. **4**: 165. 1891; Greene, Fl. Franciscana 344. 1892, Man. Bot. San Francisco Bay Reg. 163. 1894; Britton in Britton & Brown, Ill. Fl. N. States **3**: 235. 1898; Howell, Fl. NW. Am. 281. 1900; Cowell in Bailey, Cyclop. Am. Hort. 1757. 1902; Small, Fl. SE. U. S. 1124. 1903; Post & Kuntze, Lexic. Gen. Phaner. 545. 1903 (as *Symphorocarpus*); Dalle Torre & Harms, Index Siphon. 509. 1905; Robinson & Fernald in Gray, Man. (ed. 7) 757. 1908; Coulter & Nelson, New Man. Rocky Mts. Bot. 470. 1909; Schneider, Ill. Handb. Laubholzk. **2**: 670.

1911 (as *Symphoricarpus*); Britton in Britton & Brown, Ill. Fl. N. States (ed. 2) **3**: 276. 1913; Rehder in Bailey, Stand. Cyclop. Hort. 3292. 1917; Rydberg, Fl. Rocky Mts. 813. 1917; Bailey, Man. Cult. Pl. 722. 1924; Standley, Contr. U. S. Nat. Herb. **23**: 1398. 1924; Jepson, Man. Fl. Pl. Calif. 966. 1925; Keck, Bull. So. Calif. Acad. Sci. **25**: 71. 1926; Rehder, Man. Cult. Trees Shrubs 811. 1927 (as *Symphoricarpus*).

Lonicera Linnaeus, Sp. Pl. 173. 1753, ex p.

Vaccinium Linnaeus, Sp. Pl. 350. 1753, ex p.

Symphoricarpa Necker, Elem. Bot. **1**: 129. 1790.

Symphoria Persoon, Syn. **1**: 214. 1805, pro syn. *Lonicera* sect. *Symphoricarpos;* Pursh, Fl. Am. Sept. **1**: 162. 1814; Nuttall, Gen. Am. Pl. 25. 1814; Sprengel, Syst. Veg. **1**: 757. 1825.

Anisanthus Willdenow MS. ex Roemer & Schultes, Syst. Veg. **5**: XIV, 223. 1819.

Margaris De Candolle, Prodr. **4**: 483. 1830.

Descliaea Sessé & Mociño ex DC. l.c., pro syn. *Margaris.*

Shrubs with opposite, simple, short-petioled, exstipulate, entire or sometimes sinuately toothed or lobed deciduous leaves, and small, perfect, pink or white flowers in axillary or terminal clusters, or solitary in the axils of the upper leaves; winter buds with 2 pairs of outer scales; calyx acetabuliform, the teeth 5 or 4; corolla sympetalous, 5- or 4-lobed, campanulate to tubular-funnelform, or salverform, regular or nearly so, or sometimes slightly gibbous at the base, often villous within; stamens 5 or 4, equal or subequal, inserted on the corolla; ovary inferior, 4-loculed, two of the locules containing several abortive ovules, the other two locules each with a single pendulous ovule; style 1; stigma capitate or slightly 2-lobed; fruit a globose, ovoid, or ellipsoid, white, red, or black, dipyrenous berry-like drupe,[1] the nutlets oval, more or less compressed; seeds with endosperm, the embryo minute.

TYPE SPECIES: *Symphoricarpos orbiculatus* Moench (*Lonicera Symphoricarpos* L.).

The genus falls naturally into two well-defined biological subdivisions. These were loosely treated by Gray in 1873 as sections without names. Zabel, in 1903, named them, but his names are *nomina nuda.* There seems to be good reason for treating these two main groups as subgenera. Such a procedure is in conformity with the prevailing treatment in many other genera, and obviates the undesirable necessity of using adjectival names. It is provided in the International Rules of Botanical

[1] As pointed out by Asa Gray in 1873, the fruit is a drupe with usually two nutlets. Recently, Norma Pfeiffer (Contr. Boyce Thompson Inst. **6**: 103–122, *f. 1–6.* 1934) reported results of a histological study of the fruits of *S. racemosus* [*S. rivularis* Suksd.] which confirm Gray's statement.

Nomenclature that subgeneric or sectional names should be substantives resembling the names of genera. Accordingly, for the two subgenera of *Symphoricarpos* I have selected the name EUSYMPHORICARPOS for the group with the short corollas, and for the group with long corollas the name ANISANTHUS has been used.

KEY TO THE SPECIES OF SYMPHORICARPOS

Fruit bluish black; nutlets pilose; leaves and twigs glabrous; flowers in short terminal peduncled spikes; corolla shortly campanulate, symmetrical, glabrous within, the lobes about as long as the tube; style glabrous, 6–7 mm. long, equalling the corolla; anthers 2 mm. long; Chinese species. ..... 1. *S. sinensis*

Fruit white or red; nutlets glabrous; flowers chiefly axillary; North American species.

The corolla shortly campanulate, pubescent within, often slightly ventricose on the lower side, the lobes about as long as or slightly longer than the tube.

Fruit white; style glabrous; or if pilose, 4–8 mm. long

Style and stamens shorter than or equalling the corolla, not exserted; style 2–3 mm. long, glabrous.

Erect shrubs; corolla 5–6 mm. long; upper surface of leaves glabrous or glabrescent; nutlets 4–6 mm. long, 3–3.5 mm. wide.

Young twigs glabrous; leaves usually glabrous, varying to sparsely pilose on the lower surface; the larger fruits usually 1–1.5 cm. in diameter when fully mature, in terminal and axillary glomerules; shrub 1–3 m. tall, rarely smaller in dry habitats; indigenous west of the Continental Divide; introduced into eastern North America..... 2. *S. rivularis*

Young twigs finely crisp-puberulent; leaves usually densely short-pilose, prominently reticulate, and pale green or glaucous beneath; mature fruits 6–10 mm. in diameter, in pairs or solitary in the upper axils; shrub 20–80 cm. tall; east of the Continental Divide. ..... 3. *S. albus*

Low diffuse or trailing shrubs; corolla 3–5 mm. long; leaves pubescent, at least on the lower surface; fruits 4–6 mm. in diameter; nutlets 2.5–3 mm. long, 1.5–2 mm. wide; Pacific Coast species.

Young twigs closely puberulent or sparsely pilose with short, curved trichomes, or sometimes glabrous.

Leaves firm, roundish oval, rounded at each end, copiously pilosulous beneath, slightly less so above; young twigs usually closely tomentulose-puberulent; California. ..... 4. *S. mollis*

Leaves thin, oval, usually acutish at each end, glabrous or nearly so above, sparsely pilosulous beneath; young twigs

nearly glabrous or only sparingly pilosulous; southern British Columbia to northern Idaho, western Oregon, and northwestern California. .....5. *S. hesperius*

Young twigs softly velutinous or short-villous, often densely so, with straight spreading trichomes; leaves oval, often sinuate, the lower surface whitish or pale green, prominently veined and copiously pubescent; upper surface dark green, softly pubescent; mountains of California and adjacent Nevada, and southern Oregon. .....6. *S. acutus*

Style and stamens shortly exserted; corolla 6–9 mm. long; style 4–8 mm. long, pilose or glabrous; leaves oval, thick, usually 3–7 cm. long; young twigs puberulent. .....7. *S. occidentalis*

Fruit red, ellipsoid, glaucous, 5–7 mm. long; flowers in short dense axillary clusters; style and stamens included, the former pilose, 2 mm. long; erect shrub with the young twigs pubescent. ....8. *S. orbiculatus*

The corolla elongate-campanulate to tubular-funnelform or salverform, symmetrical, not at all ventricose, the lobes much shorter than the tube; fruit white, ellipsoid; style shorter than the corolla.

Corolla elongate-campanulate or tubular-funnelform, 6–13 mm. long, with 5 glandular areas (nectaries) at the base; style 3–5 mm. long, usually glabrous; anthers equalling or somewhat shorter than the free portion of the filaments.

Anthers as long as or slightly longer than the corolla-lobes; corolla about 1 cm. long; leaves oval, acute, dark green and glabrous above, pale beneath; New Mexico, Mexico, and Guatemala..... .....9. *S. microphyllus*

Anthers shorter than the corolla-lobes; species of western United States, rarely also northern Mexico.

Young twigs completely glabrous.

Corolla elongate-campanulate, 6–9 mm. long; leaf-buds lanceoloid, acuminate.

Corolla 8–9 mm. long; leaves glabrous; erect shrub. ....10. *S. tetonensis*

Corolla 6–7 mm. long; leaves glaucous, pilosulous, rarely glabrous; low spreading shrub. .....12. *S. Parishii*

Corolla tubular-funnelform, 11–13 mm. long; leaf-buds ovoid, acute; leaves almost always perfectly glabrous; erect shrub. .....13. *S. oreophilus*

Young twigs puberulent or pubescent; corolla pilose within.

The young twigs tomentulose-puberulent or loosely (sometimes only sparsely) pilosulous.

Corolla elongate-campanulate, 6–9 mm. long.

Erect shrub; corolla 7–9 mm. long, oblong-campanulate, the interior of the tube pubescent only on the lower half; leaves only slightly or not at all glaucous, puberulent;

young twigs usually densely (or on occasional specimens only sparsely) softly tomentulose-puberulent; British Columbia to Colorado and eastern California. .....11. *S. vaccinioides*

Low spreading shrub, the branches declined, often rooting at the tips; corolla 6–7 mm. long, tapering below, the interior of the tube pilose throughout; leaves glaucous, pilosulous; young twigs loosely short-pilosulous, or occasionally the internodes glabrous; southern California and adjacent Arizona. .....12. *S. Parishii*

Corolla tubular-funnelform, 9–12 mm. long, pubescent within; young twigs tomentulose-puberulent with short, curved trichomes.

Erect shrub; leaves puberulent, scarcely paler beneath, the principal veins on the upper surface prominent (in herbarium specimens); petioles 2–4 mm. long; nutlets lanceoloid or fusiform, acute or apiculate at the base, 5–7 mm. long; Wyoming, Utah, Colorado, and northern Arizona. .....13. *S. utahensis*

Trailing shrub; leaves short-pilosulous, paler beneath, the veins on the upper surface obscure; petioles 1–2 mm. long; nutlets ellipsoid, flattened, acutish at the base, 4–5 mm. long; southern Colorado, New Mexico and western Texas. .....14. *S. Palmeri*

The young twigs densely pubescent with straight, spreading trichomes; corolla tubular-funnelform, 8–10 mm. long; anthers reaching only to the base of the corolla-lobes; leaves roundish oval, dark green, obtuse or obtusish, softly pubescent on both surfaces, 1–3 cm. long, 6–18 mm. wide; Arizona and New Mexico. .....16. *S. rotundifolius*

Corolla salverform, 11–13 mm. long, with only one small basal glandular area (nectary); style 5–7 mm. long, usually pilose above the middle; anthers sessile, one-fourth the length of the corolla-lobes; leaves oblanceolate, glaucous, 6–15 mm. long, 2–5 mm. wide; Utah, Nevada, California, Arizona. .....17. *S. longiflorus*

Subgenus I. **Eusymphoricarpos**, subgen. nov. Corolla shortly campanulate, 3–9 mm. long, pubescent within, the lobes about as long as or slightly longer than the tube; fruit subglobose to ovoid, black, red, or white.

Symphoria Persoon ex Pursh, Fl. Am. Sept. **1**: 162. 1814. — *Symphoricarpos* sect. 1. *Borcales* Gray ex Schneider, Ill. Handb. Laubholzk. **2**: 669. 1911. — *Symphoricarpos* sect. *Breviflorae* Zabel in Beissner, Schelle & Zabel, Handb. Laubholz-Benennung 445. 1903, *nomen nudum*. — Type species: *Symphoria glomerata* Pursh (*Symphoricarpos orbiculatus* Moench.)

1. **Symphoricarpos sinensis** Rehder in Sargent, Pl. Wilson. 1: 117. 1911, in Bailey, Stand. Cyclop. Hort. 3294. 1917, Man. Cult. Trees Shrubs 812. 1927.

An erect shrub 1–1.5 m. tall; branches slender, glabrous, becoming reddish brown; bark fibrous; buds small, brown, acute, with several scales; leaves glabrous, oval to rhombic-ovate, acute or obtusish at the apex, cuneate at the base and narrowed to the petiole, the blades 1.5–2.5 cm. long, 1.2–1.8 cm. wide, green on the upper surface, the lower surface glaucescent, 4–6-veined; petioles 1–2 mm. long; flowers sessile, solitary in the axils of subulate bracts which are shorter than the ovary, forming a slender, terminal, 6–12-flowered spike; calyx-teeth ovate-lanceolate, acute, glabrous, about 1 mm. long; corolla white, campanulate, nearly symmetrical, 5–7 mm. long, glabrous inside and out, the lobes ovate, the tube slightly ventricose; stamens equalling or slightly longer than the corolla; anthers 2 mm. long, white; style glabrous, 6–7 mm. long; stigma capitate; fruit ovoid, 7 mm. long, bluish black, pruinose, the apex contracted to a short beak; nutlets ovoid, 5 mm. long, white, densely pilose.

TYPE LOCALITY: Fang Hsien, western Hupeh, China. Collected by E. H. Wilson in July, 1907.

RANGE: Central and southwestern China.

SPECIMENS EXAMINED: CHINA: Western Hupeh: Fang Hsien, Ta-pa-shan, thickets, rare, altitude 2300 m., July, 1907, *E. H. Wilson 718* (TYPE, A). Yunnan: Loufou, near Tungchwan, October 2, 1909, *F. Ducloux 1640* (UC); Lan-ping Hsien, October 12, 1933, *H. T. Tsai 56214* (A). NORTH AMERICA: formerly cultivated in the Arnold Arboretum, specimens collected September 10, 1908, *Rehder* (A), October 13, 1912, *Wilson* (A), October 2, 1909, *Rehder* (UI).

The occurrence of an Asiatic *Symphoricarpos* is highly interesting because, as pointed out by Professor Rehder in the original publication of this species, it adds one more genus to the number of those formerly considered peculiar to the flora of North America, but which in recent years have been discovered in western and central China, such as *Nyssa, Sassafras, Liriodendron, Decumaria,* and others. *Symphoricarpos sinensis* constitutes a distinct section of the genus, and is well separated biogeographically from all its congeners by its restricted present-day range. In the shape of the corolla it is plainly a member of the subgenus EUSYMPHORICARPOS, and is most similar in this respect to *S. orbiculatus,* but the black fruits with pilose nutlets, both unique characters in this genus, and the terminal peduncled spikes, as well as the elongated

style, separate it completely from any of the other species. We must conclude, then, that *S. sinensis* is an ancient species that has been isolated at least since the Cretaceous, remaining today as the sole known representative of its genus on the continent of Asia, and probably, as indicated by the paucity of herbarium specimens, rather rare and local at the present time.

2. **Symphoricarpos rivularis** Suksdorf, Werdenda **1**: 41. 1927.

Symphoria racemosa sensu Loddiges, Bot. Cabinet **3**: no. 230. 1818; Sims, Bot. Mag. **48**: *pl. 2211.* 1821; Watson, Dendr. Brit. **1**: *pl. 7.* 1825. Non Pursh 1814.

Symphoria elongata Presl ex De Candolle, Prodr. **4**: 339. 1830, pro syn. *Symphoricarpos racemosus.*

Symphoria heterophylla Presl ex De Candolle, ibid.; Rafinesque, New Fl. **3**: 21. 1836, *nomen dubium.*

Symphoricarpos racemosus sensu Hooker, Fl. Bor. Am. **1**: 285. 1833, ex p., excl. syn.; Loudon, Arb. et Frut. Brit. **2**: 1059, *f. 826.* 1838, Encycl. Trees Shrubs 542, *f. 1012.* 1842; Torrey in Bot. Wilkes Exped. **17**: 327. 1874; Gray, Man. Bot. N. U. S. (ed. 5) 203. 1875, in Brewer & Watson, Bot. Calif. **1**: 279. 1876; Coulter, Man. Bot. Rocky Mt. Reg. 125. 1885; Dippel, Handb. Laubholzk. **1**: 278. 1889; Greene, Fl. Franciscana 344. 1892, Man. Bot. San Francisco Bay Reg. 163. 1894; Britton in Britton & Brown, Ill. Fl. N. States **3**: 235, *f. 3451.* 1898; Rydberg, Mem. N. Y. Bot. Gard. **1**: 270. 1900; Howell, Fl. NW. Am. 281. 1900; Piper & Beattie, Fl. Palouse Reg. 170. 1901; Jepson, Fl. W. Middle Calif. 472. 1901, (ed. 2) 395. 1911; Cowell in Bailey, Cyclop. Am. Hort. 1757, *f. 2447.* 1902; Keeler, Our Northern Shrubs 287, *pl. opp. p. 288.* 1903; Piper, Contr. U. S. Nat. Herb. **11**: 528. 1906; H. M. & C. C. Hall, Yosemite Fl. 235. 1912; Britton in Britton & Brown, Ill. Fl. N. States (ed. 2) **3**: 276, *f. 3976.* 1913; Small & Carter, Fl. Lancaster Co., Pennsylvania 275. 1913; Piper & Beattie, Fl. SE. Wash. Adj. Idaho 236. 1914; Bean, Trees Shrubs Hardy Brit. Isles **2**: 564. 1914; Longyear, Trees Shrubs Rocky Mt. Reg. 217, *f. 119a.* 1927; Kirkwood, N. Rocky Mt. Trees Shrubs 295, *pl. 33.* 1930. Non Michx. 1803.

Symphoricarpos racemosus var. *macrophylla* Lavallée, Enum. Arbres Arbriss. 142. 1877, *nom. nud.*

Symphoricarpos racemosus var. *foliis variegatis* Lavallée, l.c., *nom. nud.*

Symphoricarpos racemosus var. *macrocarpa* Lavallée, l.c., *nom. nud.*

Symphoricarpos racemosus var. *glaucus* Lavallée, l.c., *nom. nud.*

Symphoricarpos racemosus var. *laevigatus* Fernald, Rhodora **7**: 167. 1905; Robinson & Fernald in Gray, Manual (ed. 7) 757. 1908; Schneider, Ill. Handb. Laubholzk. **2**: 671, *f. 429 l–o.* 1911; Clements, Rosendahl & Butters, Minnesota Trees & Shrubs 286. 1912; Mathews, Field Book Am. Trees Shrubs 392, *f. opp. p. 392.* 1915; Beckett in Garden **84**: 17. 1920; Anon. in Gard. Chron. (ser. 3) 161, *suppl. pl. opp. p. 64.* 1924.

Symphoricarpos hyalinus Heller ex Schneider, Handb. Laubholzk. **2**: 672. 1911, pro syn. *S. racemosus.*

Symphoricarpos ovatus Hort. ex Schneider, op. cit. 673, *nomen dubium.*

Symphoricarpos racemosus laevigatus Piper & Beattie, Fl. SE. Wash. Adj. Idaho 236. 1914.

Symphoricarpos albus var. *laevigatus* Blake, Rhodora **16**: 119. 1914; Rehder in Bailey, Stand. Cyclop. Hort. 3293. 1917; Bailey, Man. Cult. Pl. 722. 1924; House, N. Y. State Mus. Bull. **254**: 650. 1924; Pease, Vasc. Pl. Coos Co., N. H. 342. 1924; Wiegand & Eames, Fl. Cayuga Basin 387. 1926; Rehder, Man. Cult. Trees Shrubs 811. 1927; Rosendahl & Butters, Trees Shrubs Minnesota 352. 1928; St. John, Fl. SE. Wash. Adj. Idaho 395. 1937; Van Dersal, U. S. Dept. Agric. Misc. Publ. **303**: 268, *pl. 41, fig. a.* 1938.

Symphoricarpos albus sensu Piper & Beattie, Fl. NW. Coast 338. 1915; Rydberg, Fl. Rocky Mts. 813. 1917; Standley, Contr. U. S. Nat. Herb. **22**: 413. 1921; Jepson, Man. Fl. Pl. Calif. 966, *f. 900.* 1925; Tidestrom, Contr. U. S. Nat. Herb. **25**: 515. 1925; Longyear, Trees Shrubs Rocky Mt. Reg. 217. 1927; Gilkey, Spring Fl. NW. Oregon 130, *fig.* 1929; Dayton, U. S. Dept. Agric. Misc. Publ. **101**: 151, *f. 39.* 1931; Rydberg, Fl. Prairies Plains 748. 1932; Small, Man. SE. Fl. 1273. 1933; Benson, Contr. Dudley Herb. Stanford Univ. **2**: 153. 1930; St. John, Fl. SE. Wash. Adj. Idaho 395. 1937; G. N. Jones, Univ. Wash. Publ. Biol. **7**: 152. 1938; Applegate, Am. Midl. Nat. **22**: 302. 1939; McMinn, Ill. Man. Calif. Shrubs 531, *f. 634, 636.* 1939. Non *Vaccinium album* L.

Symphoricarpos albus var. *macrocarpus* Hort., Anon. in Gard. Chron. (ser. 3) **60**: 304, *f. 132.* 1916.

Symphoricarpos albus var. *ovatus* Rehder in Bailey, Stand. Cyclop. Hort. 3293. 1917, Man. Cult. Trees Shrubs 811. 1927; Krüssmann, Laubgehölze 314. 1937.

Symphoricarpos albus laevigatus Nash in Addisonia **3**: 27, *pl. 94.* 1918.

Symphoricarpos albus var. *laevigatus variegatus* Nash, Jour. N. Y. Bot. Gard. **21**: 76. 1920.

Symphoricarpos leucocarpus Hort. ex Koch, Dendrol. **2**: 49. 1872 pro syn. *S. racemosus;* McMahon ex True, Proc. Am. Phil. Soc. **67**: 14. 1928 (as *"leucocarpa"*).

Symphoricarpos albus f. *laevigatus* G. N. Jones, Univ. Wash. Publ. Biol. **6**: 236. 1936.

An erect, branched shrub 1–3 m. tall, rarely smaller in dry habitats; young twigs slender, almost always completely glabrous; bark of the older branches gray, smooth, not shreddy or only slightly so; bud-scales glabrous; leaves of the flowering branches oval, 2–3 cm. long, 7–15 mm. wide, rarely smaller on stunted plants, acutish at the base, the apex acute or obtusish, the upper surface dark green and glabrous, the lower surface scarcely paler, completely glabrous or with a few scattered trichomes, the margin glabrous or sparsely ciliate, entire, or on young shoots sinuate or lobed; petioles 2–4 mm. long; flowers often numerous in short peduncled racemes 1–2.5 cm. long at the tips of the branches, sometimes some of

them also in the uppermost axils; bracts and bractlets glabrous; calyx glabrous, the teeth triangular, acute, 0.5 mm. long; corolla 5–7 mm. long, rosy pink shading to white, strongly ventricose on the lower side, whitish villous inside, the lobes equalling the tube, 2–2.5 mm. long, minutely granular on the margins, obtuse; anthers 1–2 mm. long, the free part of the filament 1.5 mm. long; style glabrous, 2 mm. long, shorter than the tube of the corolla; stigma capitate, 0.5 mm. in diameter; fruits white, subglobose, or ellipsoid, in terminal glomerules, the larger ones usually 12–15 mm. in diameter or length when fully mature; nutlets 2, oval, plano-convex, obtuse at each end, 4–6 mm. long, 3–3.5 mm. wide.

TYPE LOCALITY: Holmes Creek, near Laurel, Falcon Valley, Klickitat County, Washington. Collected by W. N. Suksdorf in 1912 and 1914.

RANGE: Southeastern Alaska to California, eastward to Montana; frequently cultivated, and often fugitive or naturalized in eastern North America from Quebec to Minnesota and southward to northern Illinois, and eastern Tennessee and Virginia.

REPRESENTATIVE SPECIMENS: ALASKA: Chilkat Valley, *Walker 1074* (F, Mo. US), *1068* (Mo, US); Haines, *Scheuber* in 1909 (US). BRITISH COLUMBIA: Skidegate Inlet, *Newcombe* in 1897 (Can); Stikine River, *Cooper & Andrews 412* (F); Campbell River, *Howell 7733* (Cal); Victoria, *Coville & Kearney 271* (US); Chilliwack Valley, *Macoun 64662* (NY, F); Revelstoke, *Shaw 879* (Mo, NY, P). WASHINGTON: Oyhut, *Lamb 1267* (F, NY, P, Mo); Clallam Co., *Elmer 2738* (US, NY, Mo); Columbia River, *Pringle* in 1881 (F); Montesano, *Heller 3948* (US, F, Mo, UI, NY, UC, P); Peshastin, *Sandberg & Leiberg 804* (UI, UC, NY); Pullman, *Elmer 836* (US, Mo, NY); Falcon Valley, *Suksdorf 7557* (NY, US, A, Mo, F, P, UI, ISOTYPES); Columbia National Forest, *Kienholz 235, 257, 266* (UI). OREGON: Silver Creek, *Hall 223* (Mo, F); Portland, *Eastwood 1129* (Cal), *Sheldon 12085* (F); Sisters, *Benson 2258* (NY, Mo); Prineville, *Leiberg 819* (US, UC, NY); Ashland, *Applegate 2145* (US). CALIFORNIA: Kings Mt., *Baker 238* (Cal, NY, Can, US); Quincy, *Heller 10858* (UC, UI, Mo, NY); Los Gatos, *Heller 7448* (NY, UC). ALBERTA: Crows Nest Pass, *Macoun 20607* (NY). IDAHO: Lake Pend d'Oreille, *Sandberg, et al. 952* (Mo, F, UI, P, NY); Lake Waha, *Heller 3412* (US, NY, UC, P, Mo, A). MONTANA: Glacier National Park, *Standley 17867* (NY, US); Gallatin Basin, *Blankinship 234* (F, US, Mo, Can, P); Forks of the Madison, *Rydberg & Bessey 5023* (US, NY, F); Jack Creek Canyon, *Rydberg & Bessey 5022* (US, NY, Can); Emigrant Gulch, *Rydberg & Bessey 5025* (NY, F). WYOMING: Alpine, *Payson & Armstrong 3605*

(Mo, P); Hot Spring Bar, *Merrill & Wilcox 1041* (US, NY); Madison Canyon, *Nelson & Nelson 6758* (NY, Mo, US). COLORADO: Meeker, *Maguire & Piranian 12879* (Mo.); Denver, *Bisson 14* (Mo); Golden, *Ward* in 1881 (US); Estes Park, *Allen 138* (Mo); Empire, *Vasey* in 1889 (US).

Symphoricarpos rivularis is commonly cultivated, and occurs in eastern North America as a fugitive from cultivation, or as a naturalized plant in those states and provinces indicated by the following selected list of specimens.

QUEBEC: Bic, *Collins & Fernald 135* (Can, US, UI, UC); Montmorency Falls, *Macoun 68139* (Can), *Jack* in 1895 (A). NOVA SCOTIA: Weymouth, *Fernald & Long 24536* (P); Barrington Passage, *Macoun 81574* (Can). NEW BRUNSWICK: Kent Co., *Fowler* (F). MAINE: Portland, *Fernald, Long & Norton 14595* (P, A). NEW HAMPSHIRE: Derry, *Seaman* (US). VERMONT: Middletown Springs, *Carpenter* in 1932 (Cal); Wilmington, *Carpenter, et al.* in 1925 (Mo); Peacham, *Blanchard* in 1884 (Mo). MASSACHUSETTS: Canton, *Blake 1735* (US). CONNECTICUT: Somers, *Weatherby 5258* (US); Ridgefield, *Eames 5517* (NY). RHODE ISLAND: Providence, *Collins* in 1892 (US). NEW YORK: White Creek, *McCall* in 1876 (UC); Clove, *Standley & Bollman 12192* (US); Hempstead, *Bicknell 8074* (NY). NEW JERSEY: Fanwood, *Moldenke 6208* (NY); Charlotteburg, *Mackenzie 3131* (NY, US, Mo). PENNSYLVANIA: Easton, *Porter* in 1887 (F). DISTRICT OF COLUMBIA: Washington, *Hunter* in 1897 (US), *Ward* in 1877 (US, Mo). MARYLAND: Smithsburg, *Norton* in 1902 (Mo); Piney Point, *Vasey* in 1874 (US). VIRGINIA: Mt. Crawford, *Heller 1359* (US, P); Holston Valley, *Small* in 1892 (Mo, NY, F, UC, P, US, A). TENNESEE: Cocke Co., *Kearney 733* (Mo, NY, US). OHIO: Cincinnati, *Lloyd* in 1879 (F); Fox Lake, *Selby 1414* (P). ONTARIO: Queenston Heights, *Macoun 20604, 62964* (Can). MICHIGAN: Mackinac Island, *Williamson 2411* (P); Haslet, *Yuncker 424* (US); Midland, *Dreisbach* in 1918 (F, P). INDIANA: Porter Co., *Standley 57351* (US, Mo, UC, F, A). ILLINOIS: Highland Park, *Sherff* in 1911 (Mo). MISSOURI: St. Louis, *Sherff 265* (F).

Although it was not proposed until 1927, *S. rivularis* Suksd. appears to be the earliest available binomial for this western American species. Unfortunately, the type specimen is scarcely typical, and apparently Suksdorf distributed only a single set of specimens. They consist of parts of a small shrub from a dry habitat, with unusually small leaves and small fruits. However, a large number of other collections from western Washington and western Oregon have been examined during

the course of the present study, and there is, therefore, no doubt that Suksdorf's plants are conspecific with the common, erect, glabrous, short-flowered shrub distributed throughout the region; and they differ in no other respect than in size from several hundred other specimens examined by the writer. Furthermore, the identity of Suksdorf's material is amply proved by an excellent series of specimens collected near the type locality in 1928 by R. Kienholz and deposited in the herbarium of the University of Illinois.

Symphoricarpos rivularis is the common native snowberry occurring at low altitudes from Alaska to California and eastward to Montana. It occurs in eastern North America only as a cultivated plant, and in certain localities, as a garden escape or as a naturalized species along roads. It is a larger shrub than *S. albus*, with the leaves glabrous or nearly so, often numerous flowers in terminal or axillary spiciform racemes, and much larger fruits. It is very generally cultivated in Europe as well as in America. For this purpose it is regarded as one of the best species of the genus on account of its handsome white fruits which occur in great abundance on the slender, drooping branches and persist well into the winter season.

In 1928 Dr. R. H. True presented some additional data concerning this species, copied from unpublished manuscripts in the Library of Congress. The seeds, cuttings, and other living plant material brought back by the Lewis & Clark Expedition in 1806 were given to Bernard McMahon, a gardener and seedsman of Philadelphia, by President Thomas Jefferson who had received them from Lewis. Among this material of living plants were some specimens of the plant we now call *Symphoricarpos rivularis*. In 1812, McMahon sent some of these to Jefferson at Monticello with the following account in a letter:

"No. 2. Symphoricarpos leucocarpa (mihi). This is a beautiful shrub brought by C. Lewis from the River Columbia, the flower is small but neat, the berries hang in large clusters and of a snow white colour and continue on the shrubs, retaining their beauty, all the winter, especially if kept in a greenhouse. The shrub is perfectly hardy: I have given it the trivial english name of Snowberry-bush."[2]

The plant here mentioned is plainly *S. rivularis*. Until 1905, when Fernald investigated this plant, it was generally assumed to be *S. racemosus* Michx. [*S. albus* (L.) Blake], due, apparently, to an erroneous identification by Loddiges, who in 1818 was the first to describe and illustrate it. Loddiges says: "This plant is quite new to this country [England]; we received it, for the first time, last spring, [i.e., 1817]

[2]True, R. H., Proc. Am. Phil. Soc. 67: 14. 1928.

from our friend Mr. Robert Carr, who informs us that it is a native of the Western country of North America, and was found by Lewis and Clark beyond the rocky mountains, in August 1805: we consider it, however, to be the *Symphoria racemosa* of Michaux."

The best characters for distinguishing this species from its nearest relative, *S. albus*, are the size and arrangement of the fruits, the size and habit of the plant, the smooth twigs and leaves, as well as the different geographical distribution. Occasional specimens of *S. rivularis* have the lower surface of the leaves sparsely pilose. This fact, which has no apparent taxonomic significance, misled the present writer in 1936 (l.c.), when it was erroneously assumed that such specimens from western Washington belonged to the eastern American *S. albus*. The fact should be noted here, however, that none of the western material shows the kind and quantity of leaf-pubescence that is characteristic of *S. albus*, also that the texture and venation of the leaves of these two species are quite different. In the field, there is of course usually no problem of identification because *S. rivularis* and *S. albus* have wholly different natural geographical ranges.

The leaves of the sterile shoots, or those of the flowering branches of the season, are very variable in size, shape, toothing, and degree of lobation. The fruiting clusters often have one or more terminal flowers, *i.e.*, the flowering may continue while the fruit is maturing, the oldest fruits being at the base. A fact that has increased the difficulty of correctly interpreting herbarium specimens is that frequently both the vigorous, large-leaved branches of the season, and the slender, smaller-leaved branches of previous seasons bear flowers and fruits side by side on the same shrub, and when these are made into the conventional herbarium specimens such collections often simulate two different species. In fact, it seems to have been a rather frequent practice to name specimens consisting of old branches bearing small leaves *S. albus*, while specimens of the vigorous, large-leaved branches of the season have been frequently named var. *laevigatus*.

There is a colored plate of a fruiting branch of *S. rivularis* in Audubon's Birds of America **4**: *pl. 375*, 1835–38, and in the reprinted Macmillan edition in 1937.

A cultivated form with variegated leaves may be called f. **variegatus** (Nash), n. comb. (*S. albus* var. *laevigatus variegatus* Nash, Jour. N. Y. Bot. Gard. **21**: 76. 1920; nom.)

3. **Symphoricarpos albus** (L.) Blake, Rhodora **16**: 118. 1914; Rehder in Bailey, Stand. Cyclop. Hort. 3293. 1917; Bailey, Man. Cult. Pl. 722. 1924; House, N. Y. State Mus. Bull. **254**: 650. 1924;

Wiegand & Eames, Fl. Cayuga Basin 387. 1926; Rehder, Man. Cult. Trees Shrubs 811. 1927; Rosendahl & Butters, Trees Shrubs Minn. 351, *f. on p. 352.* 1928.

Vaccinium album L. Sp. Pl. 350. 1753.

Symphoricarpos racemosus Michx. Fl. Bor. Am. **1**: 107. 1803; Roemer & Schultes, Syst. Veg. **5**: 222. 1819; Link, Enum. Pl. Hort. Berol. **1**: 223. 1821; Barton, Fl. N. Am. **1**: 67, *pl. 19.* 1821; De Candolle, Prodr. **4**: 339. 1830; Hooker, Fl. Bor. Am. **1**: 285. 1833, ex p.; Torrey & Gray, Fl. N. Am. **2**: 4. 1841; Eaton & Wright, N. Am. Bot. 447. 1840; Torrey, Fl. N. Y. **1**: 295. 1843; Gray, Man. Bot. N. U. S. 170. 1848; Gray, Man. Bot. N. U. S. (ed. 2) 164. 1856; Koch, Dendrol. **2**: 48. 1872; Gray, Jour. Linn. Soc. Bot. **14**: 10. 1873, ex p.; Macoun, Cat. Can. Pl. **2**: 196. 1884; Gray, Syn. Fl. **1**^{2}: 13. 1886, ex p.; Watson & Coulter in Gray, Man. (ed. 6) 220. 1889; MacMillan, Metasp. Minn. Valley 483. 1892; Newhall, Shrubs NE. N. Am. 145. 1893; Koehne, Dendrol. 557. 1893; Britton in Mem. Torr. Club **5**: 306. 1894; Miller & Whiting, Wild Fl. N. E. States 236. 1895; Small, Fl. SE. U. S. 1124. 1903; Parkhurst, Trees Shrubs 278, 253, *f. 7.* 1903; Robinson & Fernald in Gray, Man. (ed. 7) 757. 1908; Jones & Rand in Bull. Vermont Agr. Sta. **145**: 179. 1909; Schneider, Ill. Handb. Laubholzk. **2**: 670. 1911; Bergman, Fl. N. Dakota 283. 1912; Clements, Rosendahl & Butters, Minn. Trees Shrubs 286, *f.* 1912; Keeler, Our Northern Shrubs (ed. 2) 289. 1912; Britton in Britton & Brown, Ill. Fl. N. States **3**: 276, *f. 3976.* 1913; Hegi, Illustr. Fl. Mitteleur. VI. **1**: 234. 1915; Mathews, Field Book Am. Trees Shrubs 391, *f. opp. p. 392.* 1915; Schaffner, Field Man. Fl. Ohio 494. 1928; Marie-Victorin, Fl. Laurent. 536. 1935.

Lonicera racemosa Persoon, Syn. Pl. **1**: 214. 1805.

Symphoria racemosa Pursh, Fl. Am. Sept. **1**: 162. 1814, ex p.; Nuttall, Gen. Am. Pl. 139. 1818; Sprengel, Syst. Veg. **1**: 757. 1825.

Symphoria alba Rafinesque, New Fl. **3**: 21. 1838, *nom. nud.*

Symphoria leucocarpa Hort. ex De Candolle, Prodr. **4**: 339. 1830, pro syn. *Symphoricarpos racemosus.*

Symphoricarpos leucocarpus Hort. ex Bosse, Vollst. Handb. Blumengärt. **3**: 458. 1842, pro syn. *Symphoria racemosa.*

Symphoricarpos racemosus var. *pauciflorus* Robbins in Gray, Manual (ed. 5) 203. 1867, ex p., emend. Fernald, Rhodora **7**: 167. 1905; Gray, Jour. Linn. Soc. Bot. **14**: 10. 1873; Macoun, Cat. Can. Pl. **2**: 196. 1884; Coulter, Man. Bot. Rocky Mt. Reg. 125. 1885; Gray, Syn. Fl. **1**^{2}: 14. 1886; Dippel, Handb. Laubholzk. **1**: 279. 1889; Watson & Coulter in Gray, Manual (ed. 6) 220. 1889; MacMillan, Metasp. Minn. Valley 484. 1892; Cowley in Bailey, Cyclop. Am. Hort. 1758. 1902; Robinson & Fernald in Gray, Manual (ed. 7) 757. 1908; Coulter & Nelson, New Man. Bot. Rocky Mts. 470. 1909; Schneider, Ill. Handb. Laubholzk. **2**: 672, *f. 429 p–r.* 1911; Clements, Rosendahl & Butters, Minnesota Trees Shrubs 286. 1912; Mathews, Field Book Am. Trees Shrubs 391, *f. opp. p. 392.* 1915.

Symphoricarpos alba "Raf." ex Koch, Dendrol. **2**: 48. 1872, pro syn. *S. racemosus.*

Symphoricarpos pauciflorus Britton, Mem. Torr. Bot. Club **5**: 305. 1894, in Britton & Brown, Ill. Fl. N. States **3**: 236. *f. 3452.* 1898; Rydberg, Mem. N. Y. Bot. Gard. **1**: 370. 1900; Rydberg, Fl. Colorado 324. 1906; Petersen, Fl. Nebraska (ed. 2) 165. 1912; Rydberg, Fl. Prairies Plains 748. 1932.

Symphoricarpos racemosus pauciflorus Rydberg, Contr. U. S. Nat. Herb. **3**: 503. 1896.

Symphoricarpos albus var. *pauciflorus* Blake, Rhodora **16**: 119. 1914; Rosendahl & Butters, Trees Shrubs Minnesota 352. 1928; Raup, Contr. Arnold Arb. **6**: 199. 1934, Nat. Mus. Can. Bull. **74**: 163. 1935, Jour. Arnold Arb. **17**: 298. 1936.

Symphoricarpos albus pauciflorus Tidestrom, Contr. U. S. Nat. Herb. **25**: 515. 1925.

Xylosteon album Moldenke, Revista Sudam. Bot. **5**: 3. 1937.

An erect shrub 20–80 cm. tall, the branches slender, often slightly curved so that the leaves are on an ascending or almost horizontal plane; young twigs slender, crisp-puberulent with short, curved hairs; bark on the older branches thin, gray, shreddy; bud-scales ciliate or puberulent; leaves of the flowering branches thin, oval to ovate or nearly orbicular, 1–3 cm. long, 8–25 mm. wide, rounded or slightly narrowed at the base, the apex acute or obtuse, occasionally apiculate, but not mucronate, the upper surface bright green, very sparsely puberulent at first, soon becoming permanently glabrous, the lower surface paler or glaucous, pilose at least along the veins, or frequently rather densely short-pilose throughout, the margin ciliate, entire, or on young shoots sinuate; petioles sparsely pilose, 2–3 mm. long, longer than the acute leaf-buds; flowers short-pedicelled, 1–5 in the axils of the upper leaves; bracts lanceolate; bractlets deltoid, very slightly or not at all ciliate; calyx irregularly 5-toothed, the sepals glabrous or more or less ciliolate; corolla pink, campanulate, somewhat gibbous at the base, 5–6 mm. long, the lobes obtuse, 2–3 mm. long, shorter than the tube and densely villous within; stamens slightly shorter than the corolla; anthers 1–1.5 mm. long, versatile, slightly shorter than the free portion of the filament; style glabrous, 2–3 mm. long, shorter than or nearly equalling the corolla-tube; stigma capitate; fruits in pairs or solitary in the axils of the upper leaves and pendent from the underside of the branchlets, white, depressed-globose, 6–10 mm. in diameter, not edible; nutlets 2, oval, plano-convex, straw-colored, rounded at the ends, smooth or nearly so, 4–5 mm. long, 2.5–3.5 mm. wide.

TYPE LOCALITY: On hills near St. Lawrence River, in the vicinity of Quebec, Ontario, Canada.[3] Collected by Per Kalm in 1749.

RANGE: Quebec to northern Alberta, southward along the eastern

[3]Svenson, H. K., Rhodora **39**: 461. 1937.

foothills of the Continental Divide to Colorado, eastward to Nebraska, Minnesota, Michigan, and the Allegheny Mountains of Virginia.

REPRESENTATIVE SPECIMENS: QUEBEC: "Hauteur des terres, prés Mistassin," *Michaux* (A, fragment of TYPE); Aylmer, *Marie-Victorin 9181* (US, F, P); Rimouski Co., *Bartram & Long 608* (P). ONTARIO: Queenston Heights, *Macoun 62963, 62964* (NY); Belleville, *Macoun 9600* (Can); Fort William, *Williamson 2010* (P). VERMONT: Burlington, *Grout* in 1894 (F, NY, US); Weybridge, *Eggleston* in 1896 (US, P, NY, F); Charlotte, *Pringle* in 1877 (Cal, F, Mo). NEW YORK: Port Henry, *Britton* in 1878 (NY); Jamesville, *House* in 1901 (NY), *Britton* in 1902 (NY); Goat Island, Niagara Falls, *Engelmann* in 1840 (Mo); Rochester, *Bartram* in 1910 (P). PENNSYLVANIA: Huntington Co., *Lowrie* in 1865 (P, F). VIRGINIA: Allegheny Mts., *Steele 308* (NY, Mo, US), Monroe Co., *Canby* (F). MICHIGAN: Norway, *Wheeler* in 1892 (US, UI, NY); Port Huron, *Dodge* in 1896 (Mo, P); Keewenaw Point, *Robbins* (NY, Mo). WISCONSIN: Alma, *Palmer 28512* (US, Mo); Ephraim, *Millspaugh 4281* (F). MINNESOTA: Sandy Lake, *Sandberg 777* (US, Mo, UC); Taylors Falls, *Rydberg 9631* (NY); Itasca Park, *Moyle 358* (Cal, F, UC, Mo, P). MANITOBA: Oak River, *Macoun & Herriot 72609* (NY); Brandon, *Macoun 12248* (Can). NORTH DAKOTA: Turtle Mts., *Lunell* in 1910 (US, UI); Walhalla, *Stevens 256* (F). SOUTH DAKOTA: Deadwood, *Carr 94* (NY, Can, US, Mo, F); Lead City, *Rydberg 744* (NY, US); Hot Springs, Fall River Co., *Palmer 37434* (US, P, NY, Mo). NEBRASKA: War Bonnet Canyon, *Williams* in 1890 (US, NY); Hat Creek Basin, *Webber* in 1889 (NY, Mo). COLORADO: Boulder, *Shear 4743* (NY); Fort Collins, *Baker* in 1896 (NY, Mo). WYOMING: Bighorn, *Tweedy 2510* (NY); Newcastle, *Hayward 2005* (F). MONTANA: Belt Creek, *Anderson* in 1884 (US). SASKATCHEWAN: Prince Albert, *Macoun 12759* (Can); Duck Lake, *Johnson 1468* (NY); without locality, *Bourgeau* in 1858 (US). ALBERTA: Peace River, *Raup & Abbe 4387* (NY, Can); Edmonton, *Macoun & Herriot 72608* (NY, Can); Chippewyan, *Laing 152* (US); Banff, *McCalla 2210* (US, NY). BRITISH COLUMBIA: Hudson Hope, *Raup & Abbe 3654* (NY, Can).

Symphoricarpos albus grows in rocky or dry soil, on river banks, in dry open rocky woods, often at the base of cliffs, or at the edges of thickets. It is not known to occur west of the Continental Divide. The flowers appear in June and July, and the fruit ripens in August and September. It was first described by Linnaeus in 1753 as *Vaccinium album*. Linnaeus' name was generally disregarded until 1914, when S. F. Blake restored it, and the shrub usually had been designated *S. racemosus*

Michx. The snowberry commonly cultivated as *S. racemosus* is *S. rivularis*. *Symphoricarpos albus* is seldom cultivated.

The plant described as *S. pauciflorus* appears to be merely an ecological form. This point has already been suggested by House, and tacitly indicated by Britton, who reduced *S. pauciflorus* to synonymy under *S. racemosus*, and by Fernald who observed that the type of Michaux's *S. racemosus* has the same leaf character as *S. pauciflorus*. I have been able to examine a fragment of Michaux's type of *S. racemosus* from "hauteur des terres prés Mistassin" [Quebec] obtained for me through the kindness of Dr. Leon Croizat of the Arnold Arboretum, and thus can verify Professor Fernald's observation. Rosendahl & Butters have pointed out that "forms intermediate between *S. albus* and *S. pauciflorus* are rather common in Minnesota." There are no distinguishing characters of flowers or fruits.

4. **Symphoricarpos mollis** Nuttall in Torrey & Gray, Fl. N. Am. **2**: 4. 1841; Walpers, Rep. Bot. **2**: 447. 1843; Bentham, Pl. Hartweg. 313. 1849; Gray, Jour. Linn. Soc. Bot. **14**: 10. 1873, in Brewer & Watson, Bot. Calif. **1**: 279. 1876, Syn. Fl. **1**^{2}: 14. 1886; Dippel, Handb. Laubholzk. **1**: 279, *f. 184*. 1889; Brandegee in Zoe **1**: 137. 1890; Davidson, List Pl. Los Angeles Co. 7. 1892; McClatchie, Fl. Pasadena 643. 1895; Davidson, List Pl. Los Angeles Co. 12, 1896; Jepson, Fl. W. Mid. Calif. 472. 1901; Abrams, Fl. Los Angeles 381. 1904, Bull. N. Y. Bot. Gard. **6**: 456. 1910; Jepson, Fl. W. Mid. Calif. (ed. 2) 395. 1911; Schneider, Ill. Handb. Laubholzk. **2**: 671. 1911; Bean, Trees Shrubs Hardy Brit. Isles **2**: 563. 1914; Rehder in Bailey, Stand. Cyclop. Hort. 3294. 1917; Abrams, Fl. Los Angeles 349. 1917; Parish, Pl. World **20**: 255. 1917; Davidson & Moxley, Fl. So. Calif. 343. 1923; Millspaugh & Nuttall, Field Mus. Publ. Bot. **5**: 251. 1923; Jepson, Man. Fl. Pl. Calif. 967. 1925, ex p.; Rehder, Man. Cult. Trees Shrubs 811. 1927; Krüssmann, Laubgehölze 314. 1937; McMinn, Ill. Man. Calif. Shrubs 533, *f. 635*. 1939.

Symphoricarpos ciliatus Nuttall in Torrey & Gray, Fl. N. Am. **2**: 4. 1841; Walpers, Rep. Bot. **2**: 447. 1843; Gray, Jour. Linn. Soc. Bot. **14**: 11. 1873; Greene, Fl. Franciscana 345. 1892, Man. Bot. Bay Reg. 163. 1894.

Symphoricarpos nanus Greene, Fl. Franciscana 345. 1892, a provisional name for *S. ciliatus*.

Symphoricarpos albus var. *mollis* Keck, Bull. So. Calif. Acad. Sci. **25**: 72. 1926; Munz, Man. So. Calif. Bot. 496, *f. 265*. 1935.

A low, trailing, diffusely branched shrub 30–90 cm. long; young

twigs usually closely tomentulose-puberulent with short, curved trichomes; bark of the older branches grayish, thin, fibrous; leaves of the flowering branches entire, ciliate, roundish oval to orbicular, dark green, 1–4 cm. long, 7–30 mm. wide, rounded or somewhat truncate at the base, the apex obtuse; upper surface pilosulous, dark green, the lower surface pale green, prominently reticulate, densely pilosulous, especially along the veins; petioles 1–3 mm. long, densely pubescent; flowers in pairs or small clusters in the axils of the upper leaves; bracts and bractlets oval or lanceolate, pubescent; calyx-lobes 0.5–0.8 mm. long, deltoid, obtuse, ciliate; corolla pink, 3–5 mm. long, asymmetrical, somewhat gibbous on the lower side, open-campanulate, glabrous outside, the lobes obtuse, 2–3 mm. long, sparsely pilose inside at the base, equalling the tube in length; stamens nearly as long as the corolla-lobes; anthers 0.8–1 mm. long, as long as the free part of the filament; style glabrous, 2 mm. long, as long as the corolla-tube; stigma capitate; fruits white, globose, 4–6 mm. in diameter; nutlets oval, plano-convex, smooth, 2.5–3 mm. long, 1.5–2 mm. wide.

TYPE LOCALITY: "St. Barbara" [Santa Barbara], California. Collected by Thomas Nuttall.

RANGE: California, chiefly near the coast.

REPRESENTATIVE SPECIMENS: CALIFORNIA: Mendocino Co., *Davy & Blasdale 5310* (US); Sonoma Co., *Samuels* (US), *M. S. Baker 3168a* (UC); Mt. Diablo, *Greene* in 1892 (UC); Mt. Tamalpais, *Heller 5713* (P, NY, US, Mo, F); Mill Valley, *Walker 642* (UC); Berkeley, *Greene* in 1887 (F); Alameda Co., *Chandler 309* (UC); Watsonville, *Elmer 4306* (Mo, NY, US, Cal); Santa Cruz Mts., *Pendleton 343* (UC), *Davis* in 1907 (UC), *Norton* in 1878 (F); Stanford University, *Elmer 2128* (Mo); Saratoga, *Davy 271* (UC); Alma Soda Spring, *Pendleton 724* (US, UC); Mt. Hamilton, *Sharsmith 3218, 3345, 3378* (UC); Los Gatos, *Heller 7455* (Mo, US, P, UC), *7455a* (Mo, NY, US, P, UC, F); Pacific Grove, *Heller 6648* (P, NY, UC, F, Mo, US), *Parish 11501* (UC); Monterey, *Brewer 617* (US, UC); Salinas, *Eastwood & Howell 2179* (F, NY, US, Cal), *Vasey 239* (US, P); San Luis Obispo, *Palmer 161* (F, NY); near Santa Barbara, *Eastwood 68* (UC, US, Mo, Cal); "St. Barbara," *Nuttall* (P, TYPE); Santa Cruz Isl., *Clokey 5216* (NY, US), *Hoffmann 196* (F); *Howell 6193* (Cal); Nordhoff, *Eastwood 4951* (Cal); Pt. Mugu, *Howell 3742* (Cal); Ojai, *Peckham* in 1866 (US); Santa Monica Mts., *Abrams 2552* (Mo, NY, P, US, Can), *Clokey & Templeton 4541* (Mo, F, UI, UC, US), *Munz & Harwood 3988, 3965* (US, UC); Mt. Wilson, *Grant 1260* (F, P); San Bernardino, *Parish*

4595 (UC); Santa Catalina Isl., *L. W. Nuttall 202* (US, F), *Brandegee* in 1890 (UC), Avalon, *Trask* in 1896 (US, NY, Mo), *Millspaugh 4704* (F), *H. H. Smith 5088* (F), *Knopf 175, 84* (F), *Eastwood 6541* (US, Cal, Mo); Cuiamaca Mts., *Palmer 119* (UC, NY, Mo, F).

Symphoricarpos mollis grows in woods and on hillsides in the coastal valleys, foothills, and canyons below 4000 feet elevation, from Los Angeles County, to Mendocino County, California. It flowers during April and May. Its nearest relative is *S. acutus* (Gray) Dieck, from which it may be distinguished by the roundish oval, obtuse, truncate-based leaves, and the fact that the young twigs are crisp-puberulent with short, curved trichomes. The nutlets of *S. mollis* are slightly smaller than those of *S. acutus*. Occasional shade-forms are nearly glabrous, as *Heller 7455* from Santa Clara County, California.

Within the last few years there has been a tendency for some botanists to regard *S. mollis* as a "variety" of the tall, glabrous western shrub (*S. rivularis*) that has been passing as *S. albus*. There is, however, no cogent reason for doing this, and the results of some recent experimental work reported by H. E. McMinn support this view. McMinn (l.c.) says: "Specimens of *S. albus* [i.e., *S. rivularis*] and *S. mollis* transplanted to the experimental plot at Mills College [California] have retained their respective differences for several years. The prostrate habit, earlier flowering period, fewer flowers, and smaller fruit easily distinguish *S. mollis* from *S. albus*."

5. **Symphoricarpos hesperius**, sp. nov.

Symphoricarpos pauciflorus sensu Howell, Fl. NW. Am. 281. 1900. Non Robbins 1867.

Symphoricarpos mollis sensu Macoun, Cat. Can. Pl. 4[2]: 331. 1888; Piper, Contr. U. S. Nat. Herb. **11**: 528. 1906; Piper & Beattie, Fl. SE. Wash. Adj. Idaho 237. 1914, Fl. NW. Coast 338. 1915; Gilkey, Spring Fl. NW. Oregon 130. 1929; Benson, Contr. Dudley Herb. Stanford Univ. **2**: 153. 1930; G. N. Jones, Univ. Wash. Publ. Biol. **6**: 236. 1936, ibid. **7**: 152. 1938. Non Nuttall ex Torrey & Gray 1841.

Symphoricarpos racemosus var. *pauciflorus* sensu Henry, Fl. S. Brit. Col. 280. 1915. Non Robbins 1867.

Symphoricarpos albus var. *mollis* sensu St. John, Fl. SE. Wash. Adj. Idaho 395. 1937. Non Keck 1926.

Frutex prostratus, ramulis 1–3 m. longis, initio puberulis, erectis vel adscendentibus; folia ovalia, vel ovata, 1–3 cm. longa et 5–20 mm. lata, acuta, basi cuneata et sensim in petiolum attenuata, supra laete viridia, reticulata, subtus pilosa; petioli teretes, 1–2 mm. longi; racemi terminales 2–5-flori; calycis dentes ovati, acuti, ciliolati, circa 1 mm. longi; corolla campanulata, rosea, 3–5 mm. longa, intus pilosa, extus

glabra, lobis ovatis tubum leviter ventricosum subaequantibus; stamina corollam subaequantia, antheris 1 mm. longis; stylus glaber; stigma capitatum, leviter bilobum; drupa alba, subglobosa, 5–6 mm. diametro; nuculae 2, ovales, albae, 3.5–4 mm. longae, 2.5–3 mm. latae.

A trailing shrub 1–3 m. long, the branches short, erect or ascending; young twigs sparsely pilosulous to glabrous; bark gray and shreddy on the older branches; leaves oval, 1–3 cm. long, 5–20 mm. wide, tapering toward each end, widest near or below the middle, acutish or obtusish at the apex, broad-cuneate to rounded at base; upper surface dark green, glabrous or nearly so, finely reticulate; lower surface very pale, prominently reticulate, sparsely short-pilose on the veins, the margin ciliate, entire, or on young shoots sinuately lobed; petiole 1–2 mm. long, sparsely pilose; flowers short-pedicelled, in small 2–5-flowered terminal racemes 2–5 mm. long; bracts linear-lanceolate; bractlets ovate, ciliate; calyx nearly regularly 5-toothed, the teeth ovate, ciliolate, 1 mm. long; corolla pink, campanulate, nearly symmetrical, not at all, or only very slightly gibbous at the base, 3–5 mm. long, the lobes sparsely pilose at base, about as long as the tube; stamens as long as the corolla, the anthers 1 mm. long, slightly shorter than the filament; style glabrous, about as long as the tube of the corolla; stigma somewhat bilobed; fruit white, subglobose, 5–6 mm. in diameter; nutlets 2, oval, plano-convex, whitish, rounded at each end, smooth or nearly so, 2.5–3 mm. long, 1.5–2 mm. wide.

TYPE LOCALITY: Upper Valley of the Nisqually River, Pierce Co., Washington. Collected by O. D. Allen in 1895.

RANGE: Southwestern British Columbia to Humboldt County, California, chiefly west of the Cascade Mountains, but occurring also in northern Idaho, and in the Blue Mountains of southeastern Washington.

REPRESENTATIVE SPECIMENS: BRITISH COLUMBIA: Mt. Benson, *Macoun 87969* (NY, Can); Shawnigan Lake, *Canby, Sargent & Muir 106* (US); Oyster River, *J. T. Howell 7562* (Cal); Nanaimo, *Macoun 87971* (NY, Can); Langford Lake, *Macoun 87970* (NY, Can); Comox, *Macoun 397* (Mo, Can); Victoria, *Eastwood 9687* (Cal); Chilliwack Valley, *Spreadborough* in 1906 (NY, Can); Yale, *Macoun 9613* (Can); Mayne Island, *Macoun* in 1914 (Can). WASHINGTON: Seahorn Hill, Whatcom Co., *H. B. Bailey 48* (NY); Upper Valley of the Nisqually River, *Allen 105* (A, TYPE, NY, Can, F, Mo, UC); Lake Crescent, *Parks 0692* (UC); Sequim, *Grant* in 1904 (F); Seattle, *Shumway* in 1892 (Mo); Shelton, *Eyerdam 1230* (Mo, F); Mt. Angeles, *Thompson 7355* (P, Mo, US); w. Klickitat Co., *Suksdorf* in 1881 (NY, P, UC, F, US); Columbia River, *Nuttall* (P); eastern Washington,

without definite locality, *Vasey 293* (NY); Johnson Creek, Kittitas Co., *Thompson 9535* (NY). IDAHO: forks of St. Mary's River, *Leiberg 1144* (NY, US, UC); Clarkia, *Quick 1082* (UC, Cal). OREGON: without locality, *Hall 223* (NY); Hood River, *Henderson 655, 326* (Mo); Tillamook Co., *Lloyd* in 1894 (NY); Rogue River, *Austin 1472* (US), *Gorman 524* (US); Chemawa, *Nelson 3701* (P); Portland, *Drake & Dickson* in 1888 (NY, F), *Howell* in 1887 (Can, UC, F, US, Mo); Suttle Lake, *Peck 14424* (P); High Prairie, Lane Co., *Coville & Applegate 1008* (US); Nichols Station, Douglas Co., *Ward 45* (US); Kitson Springs, Lane Co., *Coville & Applegate 1004* (US); Breitenbush Springs, *Applegate 2753* (US); Siskiyou Mts., *Engelmann* in 1880 (Mo); Walterville, *Eastwood & Howell 1585* (Cal); Kean Creek, Jackson Co., *Applegate 2304* (US); Mt. Hood, *Purpus 6* (F). CALIFORNIA: Upper Canyon Creek, Trinity Co., *C. Hart Merriam 512* (US); Trinity Summit, *Tracy 10415, 15120* (UC).

This newly described species has been passing as *S. pauciflorus* or, more commonly, *S. mollis*. It is not uncommon on gravelly slopes, often in open coniferous woods, at low altitudes, from southwestern British Columbia to northwestern California, and also in northern Idaho and in the Blue Mountains of southeastern Washington. It frequently has been included in *S. acutus*, from which it differs, among other characters, in the type of pubescence and in the shape of the leaves. From the Californian *S. mollis* it may be distinguished by the characters mentioned in the key.

The only other species of *Symphoricarpos* occuring in the region west of the Cascade Mountains is *S. rivularis*. From that species, *S. hesperius* differs in its trailing habit, shorter corollas, smaller fruits, and the pilosulous pubescence of the leaves and young twigs.

6. **Symphoricarpos acutus** (Gray) Dieck, Hamb. Gart. Blumenzeit. **44**: 562. 1888, Nat. Arb. Zoesch. Neuheit. 21. 1889, ex p.; Dippel, Handb. Laubholzk. **1**: 279, *f. 185*. 1889; Howell, Fl. NW. Am. 281. 1900; Rehder in Bailey, Stand. Cyclop. Hort. 3293. 1917; Bailey, Man. Cult. Plants 722. 1924.

Symphoricarpos racemosus var. *trilobus* Durand, Proc. Acad. Nat. Sci. Phila. **3**: 89. 1855.

Symphoricarpos mollis var. *acutus* Gray, Syn. Fl. 1^2: 14. 1886, ex p.; Greene, Fl. Franciscana 345. 1892; Schneider, Ill. Handb. Laubholzk. **2**: 673. 1911; Rehder, Man. Cult. Trees Shrubs 811. 1927.

Symphoricarpos pilosus Greene, ex Merriam, N. Am. Fauna **16**: 164. 1899, *nom. nud.*

Symphoricarpos mollis sensu Jepson, Man. Fl. Pl. Calif. 967. 1925, ex p.; Tidestrom, Contr. U. S. Nat. Herb. **25**: 515. 1925; Wynd, Am. Midl. Nat. **17**: 940. 1936. Non Nuttall ex Torrey & Gray 1841.

Symphoricarpos albus mollis sensu Applegate, Am. Midl. Nat. **22**: 302. 1939. Non Keck 1926.

A low, diffuse, procumbent or trailing shrub, less than 30 cm. tall, the branches 40–80 cm. long; young twigs softly velutinous-pubescent or short-villous, usually densely so, with short, straight, spreading trichomes; bark of the older branches, thin, gray, shreddy; buds ovoid, acute, villosulous, 0.5–1 mm. long; leaves oval or ovate, 1–3 cm. long, 6–18 mm. wide, the apex acutish, or obtuse, the upper surface dark green, more or less soft-pubescent, the lower surface pale green, prominently reticulate and densely pubescent, the margin entire, or more frequently sinuate or toothed, or lobed, especially on the branches of the season; petioles rather densely pubescent, 2–3 mm. long; flowers short-pedicelled, solitary or in pairs in the axils of the upper leaves; bracts and bractlets oval, densely pubescent; calyx 4–5-toothed, the sepals ciliate, acute, short-pubescent on the back; corolla bright pink, campanulate, 4–5 mm. long, the lobes obtuse, about the length of the tube and villous within; stamens shorter than the corolla; anthers 1 mm. long, versatile; style glabrous, 2–2.5 mm. long; stigma capitate; fruits in pairs or solitary in the axils of the upper leaves, white, subglobose, 4–6 mm. in diameter; nutlets 2, oval, plano-convex, obtuse at each end, 4 mm. long, 2–2.5 mm. wide.

TYPE LOCALITY: Lassen Peak, California. Collected by Mrs. R. M. Austin.

RANGE: Southern Oregon, California, in the Sierra Nevada and the Coast Range, and adjacent Nevada.

REPRESENTATIVE SPECIMENS: OREGON: Klamath Valley, *Cronkhite 79* (US); Swan Lake Valley, *Applegate 248* (UC); Keno, *Peck 9363* (P, Mo); Crater Lake, *Coville 1370* (US). NEVADA: Ormsby Co., *Baker 1496* (US, Can, Cal, Mo); Humboldt Co., *Taylor & Richardson 58* (UC); Incline, Washoe Co., *Kennedy 1441* (US, NY, UC). CALIFORNIA: McCloud, *Eastwood 1068* (NY, US, Cal); Shasta Springs, *Heller 7985* (F, P, UC, US); Forestdale, *Baker* in 1898 (UC); Rush Creek, *Yates 531* (UC, US); Rattlesnake-Colby Creek Divide, *Eggleston 7290* (US); Prattville, *Eggleston 7618* (NY, US); Mendocino Co., *Bolander 4807* (Mo, F, UC); Glenn Co., *Heller 12804* (NY, UI, US, P, Mo, Cal, F); Elk Mt., *Tracy 2334* (UC, US); Mt. Sanhedrin, *Hall 9510* (UC), *Heller* in 1902 (US, Mo); Mt. Konocti, *Blankinship* in 1928 (Cal); Jonesville, *Copeland 479* (Mo, F, UC, Cal, US); Stirling, *Heller 10802* (US, P, Mo, UC, F, NY, UI); Feather River Region, *Head* in 1921 (Cal); Sierra Nevada, *John Muir 4365* (Mo); Webber Lake, *Lemmon 277* (F); Donner Lake, *Heller* in 1903 (Mo); Truckee, *Sonne*

178 (NY, UC, Mo); Nevada, *Pratten* in 1851 (P, TYPE of *S. racemosus* var. *trilobus*); Emigrant Gap, *M. E. Jones 3292* (Cal, NY, UC, P, Mo, US); Tuolumne Grove, *Eastwood 72* (Cal); Stanislaus Forest, *Eggleston 9388* (US); Antelope, *Hansen 1867* (US, Mo); Silver Lake, *Hansen 221* (Mo, UC); Eldorado Co., *Heller 11519* (F, NY, UI, Cal, P, US); near Lake Tahoe, *Baker* in 1904 (UC), *Howell 1259* (Cal), *Grant 6971* (UC), *Hawver* in 1911 (Cal), *Eastwood 31* (Cal); Wawona Lake, *Howell 420* (Cal); Yosemite Park, *Howell 204* (Cal); Yosemite Valley, *Abrams 4617* (UC, US); Bass Lake, *Winblad* in 1937 (Cal); Pine Ridge, *Hall & Chandler 157* (Mo, NY, US, UC, P); Mineral King, *Culbertson 4557* (Mo, NY), *Fox* in 1923 (Cal); Tejon Pass, *Dudley & Lamb 4472* (US, F); Tassajara Hot Springs, *Elmer 3130* (Mo, US); San Raphael Mts., *Dearing 1859* (Cal).

This trailing snowberry occurs in California in the Sierra Nevada up to an altitude of 8500 feet, and in the Coast Range. It is found also in adjacent Nevada and in southern Oregon. It is a species that has been in cultivation since 1888. One of its closest relatives, with which it is frequently confused, is *S. mollis* Nutt. Both species occur in California, but *S. mollis* occurs chiefly at lower elevations nearer the coast. It is to be distinguished from *S. acutus* by the crisply puberulent twigs, the roundish-oval, usually entire leaves that are rounded or somewhat truncate at the base, and by the smaller nutlets. The flowering period of *S. acutus* is June and July, while that of *S. mollis*, according to dates obtained from labels of herbarium specimens, is usually in April and May.

Gray's *Symphoricarpos mollis* var. *acutus* included two distinct elements, belonging to different subgenera, one from the plains of eastern Washington, consisting of an erect shrub with cylindrical-campanulate corollas 6–9 mm. long; this is *S. vaccinioides* Rydb. The other element is a trailing subalpine shrub from the mountains of California with broadly campanulate corollas only 4–5 mm. long. This was treated as *S. acutus* by Dieck in 1888. Gray's comment about his var. *acutus* was, "Not improbably a distinct species, but materials incomplete."

7. **Symphoricarpos occidentalis** Hooker, Fl. Bor. Am. **1:** 285. 1833; Loudon, Arb. et Frut. Brit. **2:** 1059. 1838; Torrey & Gray, Fl. N. Am. **2:** 4. 1841; Loudon, Encycl. Trees Shrubs 542, *f. 1013*. 1842; Walpers, Rep. Bot. **2:** 446. 1843; Gray Man. Bot. N. U. S. 170. 1848, (ed. 2) 164. 1856, (ed. 5) 203. 1875, Jour. Linn. Soc. Bot. **14:** 10. 1873; Porter & Coulter, Syn. Fl. Colorado 54. 1874; Macoun, Cat. Can. Pl. **2:** 195. 1884; Coulter, Man. Bot. Rocky Mt. Reg. 125. 1885; Gray, Syn. Fl. **1**[2]**:** 13. 1886; Watson &

Coulter in Gray, Man. (ed. 6) 220. 1889; Dippel, Handb. Laubholzk. **1:** 280, *f. 186.* 1889; Sargent, Garden & Forest **3:** 296, *f. 46.* 1890; MacMillan, Metasp. Minn. Valley 484. 1892; Eastwood, Fl. Denver 19. 1893; Rydberg, Contr. U. S. Nat. Herb. **3:** 160. 1895; Holzinger, Contr. U. S. Nat. Herb. **3:** 229. 1895; Rydberg, Contr. U. S. Nat. Herb. **3:** 503. 1896; Hitchcock, Contr. U. S. Nat. Herb. **3:** 545. 1896; Britton in Britton & Brown, Ill. Fl. N. States **3:** 236, *f. 3453.* 1898; Rydb. Mem. N. Y. Bot. Gard. **1:** 371. 1900; Howell, Fl. NW. Am. 281. 1900; Cowell in Bailey, Cyclop. Am. Hort. 1758. 1902; Rydberg, Fl. Colorado 324. 1906; Robinson & Fernald in Gray, Man. (ed. 7) 757. 1908; Coulter & Nelson, New Man. Rocky Mt. Bot. 470. 1909; Schneider, Ill. Handb. Laubholzk. **2:** 670. 1911; Clements, Rosendahl & Butters, Trees Shrubs Minnesota 285. 1912; Petersen, Fl. Nebraska (ed. 2) 165. 1912; Bergman, Fl. N. Dak. 283. 1912; Britton in Britton & Brown, Ill. Fl. N. States (ed. 2) **3:** 277, *f. 3977.* 1913; Bean, Trees Shrubs Hardy Brit. Isles **2:** 563. 1914; Mathews, Field Book Am. Trees Shrubs 391, *f. opp. p. 392.* 1915; Rydberg, Fl. Rocky Mts. 813. 1917; Rehder in Bailey, Stand. Cyclop. Hort. 3293, *f. 3752.* 1917; Standley, Contr. U. S. Nat. Herb. **22:** 413. 1921; Bailey, Man. Cult. Pl. 722. 1924; Rehder, Man. Cult. Trees Shrubs 811. 1927; Longyear, Trees Shrubs Rocky Mt. Reg. 217, *f. 118.* 1927; Rosendahl & Butters, Trees Shrubs Minnesota 350, *f. on p. 352.* 1928; F. D. Smith, Proc. Iowa Acad. Sci. **37:** 127–130, *f. A, B.* 1930; Kirkwood, N. Rocky Mt. Trees Shrubs 294, *f. 72.* 1930; Rydberg, Fl. Prairies Plains 748. 1932; Raup, Contr. Arnold Arb. **6:** 199. 1934, Nat. Mus. Canada Bull. **74:** 163. 1935, Jour. Arnold Arb. **17:** 298. 1936; Palmer & Steyermark, Ann. Mo. Bot. Gard. **22:** 650, 1935; Graham, Ann. Carnegie Mus. **26:** 340. 1937; Krüssmann, Laubgehölze 314. 1937; Van Dersal, U. S. Dept. Agric. Misc. Publ. **303:** 268. 1938.

Symphoria occidentalis R. Brown ex Richardson in Bot. App. Franklin Jour. 734. 1823, *nom. nud.*

Symphoricarpos occidentalis var. *Heyeri* Dieck, Cat. 1888; Rehder, Man. Cult. Trees Shrubs 811. 1927.

Symphoricarpos Heyeri Dippel, Handb. Laubholzk. **1:** 281, *f. 187.* 1889; Rehder in Bailey Stand. Cyclop. Hort. 3293. 1917.

Symphoricarpos occidentalis var. *quercifolia* A. Nelson in Coulter & Nelson, New Man. Bot. Rocky Mts. 470. 1909.

Symphoricarpos occidentalis × *racemosus* Schneider, Ill. Handb. Laubholzk. **2:** 671. 1911.

An erect shrub 30–100 cm. tall, more or less branching, spreading freely from rhizomes and often forming dense colonies, the branches slender, light colored, rather stiff; young twigs puberulent (rarely completely glabrous), light reddish brown, slender, but usually more than 1 mm. in diameter; bark of the older stems gray and shreddy; leaves 2.5–11 cm. long, 1.5–7 cm. wide, oval, thick and leathery at maturity, entire, or often undulate-crenate, or sinuate or lobed on young shoots, obtuse and apiculate at the apex, or acute, the margin somewhat revolute in dried specimens, the base cuneate to rounded; upper surface dull dark green, sparsely short-pilose with scattered trichomes or more frequently glabrous except along the midvein and close to the margin; lower surface pale green, thinly pubescent at least along the veins, rarely glabrous; petioles 4–10 mm. long, pubescent; flowers sessile, 5- or 4-merous, in short, dense, axillary and terminal several–many-flowered spicate clusters 1–2.5 cm. long; bracts and bractlets broadly ovate, ciliate; calyx usually regularly 5-toothed, the teeth ovate, ciliate, 0.7–0.8 mm. long; corolla campanulate, deeply lobed, pale pink, 6–9 mm. long, 10–12 mm. in diameter when living, densely villous within, the lobes slightly longer than the tube, 3–4 mm. long, obtuse; stamens shortly exserted; anthers 2 mm. long, half the length of the filaments; style pilose near the middle, or varying to completely glabrous, 4–8 mm. long, twice the length of the corolla-tube, longer than the stamens and exserted in the living flowers; stigma yellow, capitate; fruit nearly globose, pale greenish white, 6–8 mm. in diameter, soon becoming discolored and blackish; nutlets 2, smooth, straw-colored, oval, plano-convex, 3.5 mm. long, 2–2.5 mm. wide, obtuse at the ends.

TYPE LOCALITY: "Woody country between lat. 54 and 64 . . . Dr. Richardson."

RANGE: British Columbia to New Mexico, eastward to northern Illinois and Michigan.

REPRESENTATIVE SPECIMENS: BRITISH COLUMBIA: Williams Lake, *Murie 1202* (Mo); Wilmer, *Mackay 17* (F); Lake Pakowpi, *Dawson 9612* (Can). ALBERTA: Fort McMurray, *Preble 174* (US); Wood Buffalo Park, *Raup 3061* (UC, NY, Can), *3063* (NY, US, UC, Can), *3067* (NY, US, Can); Athabaska Landing, *Hitchcock 12133* (US); Rosedale, *Moodie 1099* (US, NY, F, Mo). WASHINGTON: Okanogan Co., *Fiker 979* (US); Tonasket, *Eggleston 13018* (US), *Thompson 7104* (P, Mo, US), *8695* (Mo, A, US, NY), *10924* (Mo, A, NY). IDAHO: Lemhi Indian Reservation, *Henderson 3830* (US). UTAH: Granger, *Dodge 220* (Mo); Jensen, *Graham 9817* (US); Uinta Basin, *Petersen*

in 1912 (Mo); Wasatch Mts., *Stokes* in 1903 (US, Mo); Dry Fork, *Graham 7382* (F, US). NEW MEXICO: Johnsons Mesa, *Wooton* in 1910 (US); Bartlett Ranch, *Wooton* in 1913 (US); Yankee Canyon, *Eggleston 18957* (US, NY). COLORADO: Bear Creek Canyon, *Bethel & Clokey 4312* (US, Cal); Rye, *Clokey 4311* (Mo, US, Cal, Can, F, P, NY, UC); Rockport, *Williams 2461* (US, Mo, UC); Pueblo, *Baker et al. 3* (US, Mo, NY, UC, A, F). WYOMING: Ranchester, *Rollins 561* (NY); Gardiner River, *Nelson & Nelson 5966* (Mo, US, NY); Granger, *Aven Nelson 8136* (US, NY); Casper, *Aven Nelson 8965* (US, NY). MONTANA: Greycliff, *Eggleston 9920* (US, NY); Midvale, *Umbach 676* (US, F); Wolf Creek Canyon, *Rydberg & Bessey 5015* (F, NY, US, Can); Bozeman, *Blankinship 232* (UC, P, Mo, F, Can, US). SASKATCHEWAN: Carmichael, *Jack* (A, Cal); Kootenay Plains, *Brown 1504* (NY, P); Prince Albert, *Macoun 12219* (Can); Saskatoon, *Macoun & Herriot 72607* (F, NY). MANITOBA: Winnipeg, *Preble 74* (US), *Bourgeau* in 1857 (NY); Flinflon, *Gardner 55* (Can); Brandon, *Macoun 14136* (Can). NORTH DAKOTA: Walhalla, *Bergman 2029* (UC, P); Larimore, *Palmer 36849* (A, US); Fargo, *Stevens* in 1936 (F). SOUTH DAKOTA: Custer, *Rydberg 745, 746* (US, NY); Vermillion, *Visher 4077* (Mo); Hot Springs, *Palmer 37433* (US, Mo, P, NY, A). NEBRASKA: York, *Palmer 36052* (Mo, A); Thedford, *Rydberg 1442* (US); Carns, *Winter 97* (US). KANSAS: Solomon River, *Palmer 21338* (US, A); Trego Co., *Hitchcock 199* (NY, US, Mo); Osborne, *Shear 232* (US, NY, A); Stockton, *Gates 18139* (Mo). MISSOURI: Atchison Co., *Bush 129a* (UC, US); Watson, *Palmer 18909* (Cal, Mo, US, A). IOWA: Estherville, *Cratty* in 1882 (P, US); Fayette Co., *Fink 298* (US); Hamburg, *Bush 10307* (NY, A). MINNESOTA: Leaf Lake, *Shunk & Manning 363* (US); Itasca Park, *Grant 2824* (Mo, UC, F, US); Fort Snelling, *Mearns 403* (NY, US); Swan Lake, *Metcalf 34* (US). WISCONSIN: Alma, *Palmer 28511, 27832* (US, Mo, A). ILLINOIS: Elgin, *Benke 1615* (US). MICHIGAN: Grayling, *Piper* in 1922 (US).

By its shortly campanulate corollas *S. occidentalis* belongs quite evidently to the subgenus EUSYMPHORICARPOS. It occurs in thickets, often on open hillsides, or rocky wooded banks, or along creeks or rivers throughout much of temperate western North America. In the original description a collection is said to have been made of this species at Fort Vancouver, Washington, by David Douglas. This reference, as well as subsequent ones of the same sort undoubtedly belong to *S. rivularis*, the common species of that region. At least, a collection by Suksdorf from near Bingen, Washington in 1902, distributed as *S. occidentalis*, turns out to be *S. rivularis*. However, the former species has been dis-

covered since then in Washington, but only in the extreme northern part, in Okanogan County, where it was first found in 1916 by W. W. Eggleston.

Symphoricarpos occidentalis appears to be very uniform throughout its range, although certain variations in pubescence have been noted, as, for example, the style is commonly villous near the middle, but it varies to sparsely pilose or, in some specimens, completely glabrous. This variation has no taxonomic significance, and it appears to be correlated with no other character of the plant. A flower from an isotype ("Forest country between Lat. 54–64°, Dr. Richardson") in the herbarium of the National Museum of Canada, examined by the writer has the style pilose near the middle. When sterile, this species sometimes simulates *S. rivularis*. However, its leaves are usually larger and more rigid, and the pubescence of the young twigs is characteristic, although occasionally these are glabrous or nearly so; also the plants spread by suckers growing from rhizomes, while *S. rivularis* is a rather compact shrub. When in flower or fruit, *S. occidentalis* may be distinguished at once by the prominent style and stamens, and the smaller drupes containing smaller nutlets.

In places where the ranges of *S. albus* and *S. occidentalis* overlap, these two species may be found growing together in the same habitat. When in flower or fruit there is no difficulty in distinguishing them, but when sterile, as is frequently the condition in dry shaded habitats, *S. occidentalis* is recognizable by the fact that it is a taller, more robust shrub, with the larger oval, acute, longer petioled leaves dark green above, and somewhat paler beneath but less prominently reticulate than in those of *S. albus*, which is a much smaller shrub, with slender branches. The ovate, obtuse, short-petioled leaves are more strongly reticulate and paler green beneath. The petioles are relatively shorter, and the pubescence of the young twigs is less dense, and consists of lighter-colored, more curved trichomes.

The var. *Heyeri*, based by Dieck upon specimens from Colorado, seems to have no distinguishing characters, and is, accordingly, here reduced to synonymy. Schneider (l.c.) treated it as a hybrid between *S. occidentalis* and *S. racemosus*, but there seems to be no evidence to support such a conclusion.

8. **Symphoricarpos orbiculatus** Moench, Methodus Plant. 503. 1794; Torrey & Gray, Fl. N. Am. **2**: 4. 1841; Engelmann, Boston Soc. Nat. Hist. Jour. **6**: 215. 1857; Koch, Dendrol. **2**: 48. 1872; Dippel, Handb. Laubholzk. **1**: 278, 1889; Koehne, Dendrol. 557. 1893;

Newhall, Shrubs NE. N. Am. 145. 1893; Hitchcock & Norton, Bull. Kans. Agric. Sta. 57. 1896, 66. 1897, 76. 1898; Druery, Gard. Chron. (ser. 3) **28**: 413, *f. 128*. 1900; Lounsberry, Guide to the Trees, (ed. 2), *f. 142*. 1900; Mackenzie & Bush, Man. Fl. Jackson Co. Missouri 180. 1902; Robinson & Fernald in Gray, Man. (ed. 7) 757. 1908; Apgar, Ornamental Shrubs U. S. 228, *f. 373*. 1910; Schneider, Ill. Handb. Laubholzk. **2**: 670, 671. 1911; Bean, Trees Shrubs Hardy Brit. Isles **2**: 563. 1914; Mathews, Field Book Am. Trees Shrubs 391, *f. opp. p. 392*. 1915; Rehder in Bailey, Stand. Cyclop. Hort. 3293. 1917; Hitchcock & Standley, Contr. U. S. Nat. Herb. **21**: 260. 1919; Palmer, Jour. Arnold Arb. **2**: 152. 1921; Cocks, Jour. Arnold Arb. **3**: 181. 1922; Palmer, Jour. Arnold Arb. **4**: 30. 1923, l.c. **5**: 131. 1924, l.c. **7**: 135. 1926; Bailey, Man. Cult. Pl. 722. 1924; Rehder, Man. Cult. Trees Shrubs 812. 1927; Schaffner, Field Man. Fl. Ohio 494. 1928; Kirkwood, N. Rocky Mt. Trees Shrubs 294. 1930; Deam, Shrubs Indiana (ed. 2) 326, *pl. 136*. 1932; Rydberg, Fl. Prairies Plains 748. 1932; Palmer & Steyermark, Ann. Missouri Bot. Gard. **22**: 650. 1935; Krüssman, Laubgehölze 315. 1937; Stemen & Meyers, Oklahoma Fl. 510. 1937; Van Dersal, U. S. Dept. Agric. Misc. Publ. **303**: 268. 1938.

Lonicera Symphoricarpos Linnaeus, Sp. Pl. 175. 1753; Persoon, Synopsis **1**: 214. 1805.

Symphoricarpos vulgaris Michaux, Fl. Bor. Am. **1**: 106. 1803; J. St. Hilaire, Expos. Fam. Nat. **1**: 455. 1805; Willdenow, Enum. Pl. **1**: 221. 1809; Roemer & Schultes, Syst. Veg. **5**: 222. 1819; Link, Enum. Pl. Hort. Berol. **1**: 222. 1821. De Candolle, Prodr. **4**: 339. 1830; Loudon, Arb. et Frut. Brit. **2**: 1058, *f. 825*. 1838, Encycl. Trees Shrubs 541, *f. 1010*. 1842; Darby, Bot. Southern States 133. 1841; Torrey, Fl. N. Y. **1**: 296. 1843; Gray, Man. Bot. N. U. S. (ed. 2) 164. 1856; Chapman, Fl. Southern U. S. 169. 1860; Gray, Jour. Linn. Soc. Bot. **14**: 10. 1873, Man. Bot. N. U. S. (ed. 5) 203. 1875, Syn. Fl. 1^2: 13. 1886; Watson & Coulter in Gray, Man. Bot. N. U. S. (ed. 6) 220. 1889; Chapman, Fl. Southern U. S. (ed. 3) 187. 1897; Cowell in Bailey, Cyclop. Am. Hort. 1758, *f. 2448*. 1902; Keeler, Our Northern Shrubs 290, *pl. opp. p. 290*. 1903; Longyear, Trees Shrubs N. Rocky Mt. Reg. 218. 1927.

Symphoricarpos parviflora Desfontaines, Tabl. Ec. Bot. 114. 1804, *nom. nud.*

Symphoria glomerata Pursh, Fl. Am. Sept. **1**: 162. 1814; Elliott, Bot. S. C. & Ga. 273. 1817; Nuttall, Gen. N. Am. Pl. 139. 1818; Torrey, Fl. N. & Midd. Sect. U. S. **1**: 246. 1824; Sprengel, Syst. Veg. **1**: 757. 1825; Eaton, Man. Bot. (ed. 5) 414. 1829; Darby, Man. Bot. Southern States 133. 1841.

Symphoria rubra Rafinesque, New Fl. **3**: 21. 1838, *nom. nud.*

Symphoricarpos imberbis Tausch, Flora **21**: 734. 1838.

Symphoricarpos spicatus Engelmann, Pl. Lindh. **2**: 215. 1847, Boston Jour. Nat. Hist. **6**: 215. 1850.

Symphoricarpos erythrocarpus Koch, Dendrol. **2**: 48. 1872.

Symphoricarpos vulgaris var. *foliis aureis* Lavallée, Enum. Arbres Arbriss. 143. 1877, *nom. nud.*

Symphoricarpos vulgaris var. *glomeratus* Lavallée, op. cit. 143. 1877; Cowell in Bailey, Cyclop. Am. Hort. 1758. 1902.

Symphoricarpos vulgaris var. *spicatus* Gray, Syn. Fl. 1^2: 13. 1886.

Symphoricarpos Symphoricarpos MacMillan, Bull. Torr. Bot. Club **19**: 15. 1892, Metasp. Minn. Valley 485. 1892; Britton, Mem. Torr. Bot. Club **5**: 306. 1894, in Britton & Brown, Ill. Fl. N. States **3**: 236, *f. 3454*. 1898; Small, Fl. SE. U. S. 1124. 1903; Keeler, Our Northern Shrubs 290. 1903; Rydberg, Fl. Colorado 324. 1906; Petersen, Fl. Nebraska (ed. 2) 165. 1912; Britton in Britton & Brown, Ill. Fl. N. States **3**: 277, *f. 3978*. 1913; Rydberg, Fl. Rocky Mts. 813. 1917; Pennell in Addisonia **3**: 61, *pl. 111*. 1918; House, N. Y. State Mus. Bull. **254**: 651. 1924; Small, Man. SE. Fl. 1273. 1933.

Symphoricarpos vulgaris var. *variegatus* Hort. ex Cowell in Bailey, Cyclop. Am. Hort. 1758. 1902.

Symphoricarpos orbiculatus f. *aureo-reticulatus* Zabel in Beissner, Schelle & Zabel, Handb. Laubholz-Benennung 445. 1903.

Symphoricarpos orbiculatus var. *variegatus* Schneider, Ill. Handb. Laubholzk. **2**: 669. 1911; Bean, Trees Shrubs Hardy Brit. Isles **2**: 563. 1914; Rehder in Bailey, Stand. Cyclop. Hort. 3293. 1917, Man. Cult. Trees Shrubs 812. 1927; Krüssmann, Laubgehölze 315. 1937.

Symphoricarpos orbiculatus var. *spicatus* Schneider, l.c.

Symphoricarpos Symphoricarpos var. *variegatus* Nash, Jour. N. Y. Bot. Gard. **21**: 76. 1920.

Symphoricarpus Giraldii Hesse, Haupt-Preisliste, 1925–1926, p. 122. 1925.

Symphoricarpos vulgaris leucocarpa Andrews, Spring Cat. Rockmont Nurs. 10. 1927.

Symphoricarpos vulgaris elongata Andrews, op. cit. 23. 1932.

An erect shrub 0.5–2 m. tall; branches leafy, erect or ascending, slender, light brown or purplish; bark on the older branches gray and shreddy; young twigs rather densely villosulous-tomentulose, varying to puberulent; leaves 1–6 cm. long, numerous, oval to ovate or nearly orbicular, entire or undulate, thick, acute or obtuse at the apex, rounded or slightly acutish at the base, dull green and glabrous or sparsely pilosulous on the upper surface, the veins impressed; the lower surface soft-pubescent, paler and glaucescent, with the veins prominent; petioles 2–4 mm. long; flowers in many-flowered, densely crowded, short, axillary spikes on the branches of the season; corolla broadly campanulate, villous within, pinkish, 3–4 mm. long, turned obliquely upward, slightly ventricose on the lower side, the lobes about as long as the tube; anthers

1 mm. long, shorter than the filaments; calyx-teeth 5, triangular, ciliate, persistent on the fruit; style 2 mm. long, pilose; fruit delicate coral-red (varying to pink), or somewhat purplish tinged, glaucous, ellipsoid, 5–7 mm. long, 4–5 mm. thick, the beak about 1 mm. long; nutlets 2, oval, flattened, 2.5–3.5 mm. long, 2 mm. wide, obtuse at each end.

TYPE LOCALITY: "Habitat in Virginia, Carolina."

RANGE: Western and southern New York to Florida, westward to Texas, northern Mexico, Colorado, and eastern South Dakota; introduced, and occurring as a fugitive from cultivation, or occasionally naturalized, in New England.

REPRESENTATIVE SPECIMENS: MASSACHUSETTS: Harwich, *Fernald & Long 19138* (P); Manchester, *Chamberlain* in 1899 (NY). CONNECTICUT: Seymour, *Eames 5531* (NY); Newtown, *Harger 5210* (P). NEW YORK: Long Island, *Ferguson 8014* (NY). PENNSYLVANIA: Chestnut Hill, *Adams 2190* (UC); Easton, *Porter* in 1887 (F). NEW JERSEY: Trenton, *Fisher* in 1902 (UC). MARYLAND: Plummers Island, *Standley 11859* (US). DISTRICT OF COLUMBIA: Washington, *Ward* in 1876 (US). VIRGINIA: Mt. Crawford, *Heller 1174* (Mo, NY, UC, F, NY, A); Gloucester, *Palmer 39778* (NY, A); Montpelier, *House 2878* (NY, US). WEST VIRGINIA: Eagle Mt., *Steele* in 1903 (US, Mo, NY). KENTUCKY: Kuttawa, *Eggleston 5241* (NY, Mo); Monticello, *Smith & Hodgdon 3975* (US). NORTH CAROLINA: Richland Valley, *Small & Heller 337* (Mo, US, F, NY, UC, P); Black Mt., *Standley & Bollman 10427* (US). TENNESSEE: Paint Rock, *Redfield 5583* (Mo); Cumberland Mts., *Ruth 607* (Mo). ARKANSAS: Langley, *Demaree 9513* (NY, Mo); Beaver, *Palmer 29344* (Mo). MISSISSIPPI: Oktibbeha Co., *Pollard 1340* (US, Mo, F, NY). ALABAMA: Clay Co., *Earle 936* (NY); Fort Smith, *Bigelow* in 1853–4 (US). GEORGIA: Rome, *Canby 59* (US); Blue Ridge Mts., *Smith 2618* (F); Dacula, *Palmer 39898* (A). FLORIDA: without loc., *Chapman* in 1892 (Mo). OHIO: Yellow Springs, *Demaree 11855* (US, Mo, A). INDIANA: Greencastle, *Underwood* in 1891 (NY); Lawrence-Monroe county line, *Friesner 11568* (Cal, NY, F). ILLINOIS: East Cape Girardeau, *Palmer 14894* (Mo, Cal); Hamilton, *Davis 3511* (Mo); Evanston, *Shipman* in 1875 (P). MISSOURI: Webb City, *Palmer 737* (Mo); Worth, *Palmer 35777* (Mo); Columbus, *Palmer 36695* (Mo, A). IOWA: Keosauqua, *Pammel & Reis 452* (Mo); Des Moines, *Pammel 561* (F, Mo, US). MINNESOTA: Redwood Falls, *Watson* (US). SOUTH DAKOTA: Brookings, *Williams* (US). NEBRASKA: Franklin, *Laybourne* in 1893 (Mo); Crete, *Dreisbach 6099* (P); Lincoln, *Webber* in 1886 (Mo, NY).

COLORADO: Manitou, *Mulford* in 1892 (NY). KANSAS: Riley Co., *Norton 198* (NY, Mo, US); Wyandotte, *Mackenzie* in 1897 (NY); Osborne, *Shear 167* (US, NY, A). OKLAHOMA: Tonkawa, *Stevens 1850* (Mo, US); Tishomingo, *Houghton 3336* (NY, Mo); Norman, *Emig 343* (US). TEXAS: Decatur, *Ferris & Duncan 3321* (Cal, NY, Mo); New Braunfels, *Lindheimer 846* (TYPE collection of *S. spicatus* Engelm.), *847* (US, F, UC, NY, P, A, Mo, Can); Tarrant Co., *Ruth 187* (P, F, NY, Mo); Ganado, *Palmer 9077* (Mo, US, Cal, A). MEXICO: Santa Barbara, *Nicolas* in 1911 (US, UC); Villa Santiago, *Muller 2986* (UI).

Symphoricarpos orbiculatus occurs usually in loose dry sandy soil in woodlands, along river banks, and often in open woodland pastures. Common names in use in various parts of its range are Indian currant, coralberry, or buckberry bush. It has been in cultivation since 1730, and in many of the older settlements occurs as a garden escape. It is apparently not native in New England, or perhaps New York, but occurs there as a fugitive from cultivation. It seems to be native, however, in Pennsylvania. In Colorado it is evidently quite rare; I have seen only one herbarium collection from that state. It flowers in July, and in the autumn the slender branches are loaded with the purplish red fruits which begin to ripen in September and persist until midwinter. The fruits are produced in great abundance; as many as 200 may occur on a single branch. They have an insipid flavor and are apparently not relished by birds. The leaves turn crimson in autumn and persist in that condition for some time.

The plant introduced by Hesse as *S. Giraldii* stated to have been raised from Chinese seed, is identical with *S. orbiculatus* according to specimens received from Spaeth's nursery near Berlin; Hesse already says (l.c.) that it seems close to that species. Apparently there had been a confusion of labels in Hesse's nursery.

Plants that appear to be the result of a cross between *S. orbiculatus* and *S. microphyllus* have been in cultivation since 1912. No feral plants are known. This hybrid is:

× **Symphoricarpos Chenaultii** Rehder, Jour. Arnold Arboretum **2**: 179. 1921, Man. Cult. Trees Shrubs 812. 1927; Krüssmann, Laubgehölze 315. 1937. *Symphoricarpos parviflorus conglomeratus* Chenault, Cat. 18. 1912 = (*S. microphyllus* × *orbiculatus*).

Professor Rehder's comments are as follows: "This plant is probably a hybrid between *S. orbiculatus* Moench and *S. microphyllus* H.B.K. In its habit and the smallness of the leaves it is very similar to the latter

species, but differs in the more pubescent underside of the leaves, and in the always clustered or spicate flowers, in the shorter and broader corolla-tube only twice as long as the lobes, in the pilose and shorter style and in the red or partly red color of the fruit. From *S. orbiculatus* it is easily distinguished by the generally smaller leaves, the tubular not broadly campanulate corolla with the nectary glands extending all round below the middle, and by the lightly colored partly whitish fruit. The color of the fruit is rather peculiar; it is usually bright purplish red on the upper exposed side with numerous minute light dots and toward the lower side the color passes gradually into pinkish white sprinkled with purplish dots . . ."

This hybrid has been cultivated at the Arnold Arboretum as no. 7255, the plants received from León Chenault & Cie. at Orléans, France, in 1912 as *S. parviflorus conglomeratus*. The following herbarium specimens have been examined: Arnold Arboretum, August 1, 1916, *Rehder* (A), *Palmer* in 1936 (A), November 17, 1917, *C. K. Schneider* (UI); Highland Park, New York, *Edson* in 1917 (A).

Subgenus II. **Anisanthus**, subgen. nov. Corolla tubular or elongate-campanulate to salverform, symmetrical, not at all ventricose, the lobes much shorter than the tube; flowers chiefly axillary; style shorter than the corolla; fruit white or pink, ellipsoid; species of western North America.

Anisanthus Willd. ex Roemer & Schultes, Syst. Veg. **5**: xiv, 223. 1819. — *Symphoricarpos* sect. 2 *Meridionales* Gray ex Schneider, Ill. Handb. Laubholzk. **2**: 673. 1911. — *Symphoricarpos* sect. *Longiflorae* Zabel in Beissner, Schelle & Zabel, Handb. Laubholz-Benennung 445. 1903, *nomen nudum*. — Type species: *Anisanthus microphyllus* Willd. (*Symphoricarpos microphyllus* H.B.K.).

9. **Symphoricarpos microphyllus** Humboldt, Bonpland & Kunth, Nov. Gen. Sp. **3**: 1818; Kunth, Syn. Pl. **3**: 71. 1824; DeCandolle, Prodr. **4**: 339. 1830; Loudon, Encycl. Trees Shrubs 542, *f. 1011*. 1842; Hooker, Bot. Mag. **83**: *pl. 4975*. 1857; Koch, Dendrol. **2**: 49. 1872; Gray, Jour. Linn. Soc. Bot. **14**: 11. 1873; Hemsley, Biol. Centr.-Am. **2**: 4. 1881, **4**: 46. 1886; Urbina, Cat. Pl. Mex. 111. 1897; Rehder in Bailey, Stand. Cyclop. Hort. 3293. 1917; Standley, Contr. U. S. Nat. Herb. **23**: 1399. 1924; Rehder, Man. Cult. Trees Shrubs 812. 1927.

Symphoricarpos montanus Humboldt, Bonpland & Kunth, Nov. Gen. Sp. **3**: *pl. 296*. 1818; Maund, The Botanist **1**: *pl. 20*. 1837; Dippel, Handb. Laubholzk. **1**: 281, *f. 188*. 1889; Schneider, Ill. Handb. Laubholzk. **2**: 673, 1911.

Symphoricarpos glaucescens Humboldt, Bonpland & Kunth, Nov. Gen. Sp. **3**: *pl. 295.* 1818.
Anisanthus microphyllus Willdenow, in Roemer & Schultes, Syst. Veg. **5**: 223. 1819.
Symphoria microphylla Sprengel, Syst. Veg. **1**: 757. 1825.
Symphoria glaucescens Sprengel, l.c.
Symphoria montana Sprengel, l.c.
Descliaea leucocarpa Sessé & Mociño ex De Candolle, Prodr. **4**: 483. 1830, pro syn. *Margaris barbigera.*
Margaris nudiflora De Candolle, l.c.
Margaris barbigera De Candolle, l.c.
Symphoricarpos mexicanus Hort. ex Koch, Dendrol. **2**: 50. 1872.
Chiococca axillaris Sessé & Mociño Pl. Nov. Hisp. 36. 1887.
Lonicera vacciniifolia Hort. ex Dippel, Handb. Laubholzk. **1**: 282. 1889, pro syn. *Symphoricarpus montanus.*

An erect shrub, much branched, 2–3 m. tall; young twigs crisp-puberulent or sometimes almost tomentulose with curved trichomes; bark of the older branches smooth, scarcely shreddy; leaves oval, acute or apiculate at the apex, tapering at the base, entire, 1–2.5 cm. long, 7–15 mm. wide, dark green and glabrous or finely puberulent above, pale green and short-pilose beneath, at least on the veins, varying to glabrous; petioles 1–2 mm. long; flowers in pairs or solitary, axillary, short-pedicelled, pendent, each subtended by 2 bracts, distributed in the upper axils or also in a short, terminal, few-flowered spike; calyx glabrous or ciliate, irregularly 5-toothed, the teeth acutish; corolla narrowly campanulate or somewhat tubular, 9–10 mm. long, pinkish, the lobes equal, ovate, one-third the length of the corolla, much shorter than the tube, the inside of the throat and tube pubescent; stamens 5, slightly longer than the lobes; anthers 1.5 mm. long, half the length of the filaments; style glabrous, 4–5 mm. long, shorter than the corolla-tube; stigma capitate; fruit globose, smooth, white or tinged with pink, translucent, tipped with the persistent calyx, 7–9 mm. in diameter; nutlets flattened, oval, obtuse at each end, 3 mm. long, 2 mm. wide.

TYPE LOCALITY: "Crescit in temperatis, prope Moran Mexicanorum, alt. 1350 hex.".

RANGE: New Mexico, Mexico, and Guatemala.

REPRESENTATIVE SPECIMENS: NEW MEXICO: Craters, Valencia Co., *Wooton* in 1906 (US). MEXICO: Bartolo, *Schiede* in 1833 (US, UC); Cerro Potosi, *Mueller 1243, 2256* (F, A); Lerios, *Palmer 390* (P, F); Miquihuana, *Nelson 4474* (US); San Luis Potosi, *Parry & Palmer 296* (US, Mo, P); Metepec, *Pringle 13010* (US, F); Real del Monte, *Rose & Hough 4491* (US); San Vincente, *Fisher* in 1937 (Mo),

37191 (F); Mt. Orizaba, *Rose & Hay 5693* (US), *Seaton 187* (F, US); Colima, *M. E. Jones 223* (US, Mo); El Oro, *Rangel 6632* (US); Nevado del Toluca, *Loesner 4415* (US); mts. between Toluca and Mexico City, *Rusby 328* (US); Ixtaccihuatl, *Purpus 9* (UC), *Arsène* in 1910 (US); Tlaxacola, *Arsène 1727* (US); Morelia, *Arsène 9849* (US); Patzcuaro, *Pringle 4261* (F, UC, P, Mo, A, US), *9840* (F, Mo, US); Barranca, near Santa Fe, *Bourgeau* in 1866 (US); Tlaupujahua, *Rose & Hay 5397* (US); Boca del Monte, Puebla, *Purpus 2488* (UC); Popocatepetl, *Rose & Hay 6045* (US); Cerro Verde, *Purpus 3518* (F, UC, US); Reyes, *Nelson 1731* (US); Tehuantepec, *Orcutt 3782* (Mo). GUATEMALA: Chichavac, *Skutch 133* (US); Ziha, *Seler 3162* (Cal); Santa Maria, *Skutch 870* (F, A); Sierra Cuchumatanes, *Skutch 1253* (F, A); Volcan de Agua, *J. R. Johnston 910* (F), *202* (F).

Symphoricarpos microphyllus is reported to be one of the tallest species of the genus, and of a neat and compact appearance, with numerous, short, lateral, leafy branches. The stamens are longer than those of any other member of its group. Plainly a member of the subgenus ANISANTHUS, it forms a connecting link with EUSYMPHORICARPOS through the hybrid × *S. Chenaultii*. Only one United States collection of *S. microphyllus* has been seen, and that came from Valencia Co., New Mexico. The species is apparently not uncommon in various parts of Mexico, where it ascends to an altitude of 10,500 feet on Popocatepetl, and southward into Guatemala. It is the only species of *Symphoricarpos* known from the latter country, and thus it extends farther south than any other member of the genus.

10. **Symphoricarpos tetonensis** A. Nelson, Bull. Torr. Bot. Club **31**: 246. 1904.

Symphoricarpus montanus sensu Watson, Bot. King Exped. **5**: 132. 1871, ex p. Non H.B.K. 1818.

Symphoricarpos rotundifolius sensu Graham, Ann. Carnegie Mus. **26**: 341. 1937, ex p. Non Gray 1853.

Symphoricarpos utahensis sensu Tidestrom, Contr. U. S. Nat. Herb. **25**: 515. 1925, ex p. Non Rydb. 1899.

An erect, branched shrub 1–1.5 m. tall; young twigs glaucous, these and the leaf-buds completely glabrous; bark of the older branches smooth; leaves glabrous, oval, widest at the middle, acute or acutish at each end, 1.5–3 cm. long, 5–10 mm. wide, entire, or occasionally with a few irregular, acute teeth, veins conspicuous, and the margins often minutely thickened-revolute; petioles slender, 2–4 mm. long, glabrous, dilated and somewhat connate at the base; flowers mostly in pairs in the upper axils, drooping, short-pedicelled; bracts glabrous, glaucous,

about half the length of the ovary; calyx glabrous, glaucous, less than 2 mm. long, the lobes about as long as the tube; corolla cylindrical-campanulate, ochroleucous, tinged with pink, 7–9 mm. long, typically glabrous within, rarely slightly with 5 basal nectaries, the lobes about one-third the length of the tube; anthers 1.5–2 mm. long, equalling or slightly longer than the free portion of the filament, about half the length of the corolla-lobes; style 4 mm. long, glabrous, about half the length of the corolla; stigma capitate; fruit white, ellipsoid, 8–10 mm. long; nutlets 4–5 mm. long, 2–3 mm. wide, oval, obtusish at each end.

TYPE LOCALITY: Teton Mountains, Wyoming. Collected by Merrill & Wilcox in 1901.

RANGE: Montana, Idaho, Wyoming, Colorado, Utah, Nevada.

REPRESENTATIVE SPECIMENS: MONTANA: Alta, *Goodman 1299* (Mo); Tobacco Mts., *Butler 4265* (NY); Helena, *Butler 4089* (NY). IDAHO: Caribou Mt., *Payson & Armstrong 3596* (P, Mo); Lava, *Nelson & Macbride 1595* (Mo); Pocatello, *Palmer 430* (US), *Heller 10195* (P, US); Henrys Lake, *Blankinship* in 1899 (UC); Montpelier, *Nelson & Macbride 1046* (NY, F, US, Can, UC, Mo); Mt. Chauvet, *Rydberg & Bessey 5021* (NY, P); Salmon, *Payson & Payson 1900* (NY, Mo, Cal); Rush Creek, *M. E. Jones 6367* (NY); St. Anthony, *Merrill & Wilcox 882* (US). WYOMING: Teton Mts., *Merrill & Wilcox 1025* (US); Jelm, *Nelson 8058* (US, Mo, NY); Afton, *Payson & Armstrong 3326* (Mo, UI, P); Jackson Hole, *Williams 258* (Mo); Arizona Creek, *Murie 303* (US); Hoback Basin, *Curtis* in 1900 (NY); Battle Creek, *Tweedy 4631* (NY, US); Sublette Co., *Payson & Payson 2629* (NY, UC, Mo, P, F, US). YELLOWSTONE NATIONAL PARK: Specimen Ridge, *A. Nelson & E. Nelson 5882* (NY, US); Yellowstone Falls, *B. H. Smith* in 1911 (P). COLORADO: Little Fountain Creek, *Blumer* in 1903 (F); Ridgway, *Tweedy 188* (US); Pagosa Springs, *Bethel & Milley 4310* (NY); Wolcott, *Osterhout 2105* (NY); Montrose Co., *Payson & Payson 4226* (Mo, UC), *Payson 1038* (Mo); Marvin, *Hermann 5680* (Mo); Durango, *Zobel* in 1935 (Mo). UTAH: La Sal Mts., *Rydberg & Garrett 8937* (NY), *8868* (US); Big Cottonwood Creek, *Rydberg & Carlton 6694, 6596* (NY, US, Can); Midway, *Carlton & Garrett 6719* (NY), *Eastwood & Howell 520* (Mo, Cal); Wasatch Mts., July 1869, *Watson 475* (NY), *Tidestrom 297* (US), *1466* (US); Uinta Basin, *Graham 9472* (US); Fish Lake Plateau, *Harris C28712* (Mo); Payson Forest Reserve, *Potter* in 1905 (US); Provo Canyon, *Palmer 38106* (US), *Eastwood & Howell 489* (Cal, US); Bryce Canyon, *Eastwood & Howell 861* (Cal); Mt. Nebo, *Harris C24571* (P).

NEVADA: Gold Creek, *Nelson & Macbride 2111* (NY, Mo, US); Humboldt Reserve, *Kennedy 4436* (P).

This species was probably first collected by the Second Fremont Expedition in 1844, according to a specimen in the herbarium of the New York Botanical Garden, but it was not recognized and distinguished until Dr. Aven Nelson described it in 1904. It is closely allied to *S. vaccinioides* and *S. oreophilus*, probably closer to the former. Vegetatively, it resembles the latter in its glabrous foliage and branchlets, but it differs fundamentally in its shorter, cylindrical-campanulate corollas. From *S. vaccinioides* it may be distinguished by its glabrous twigs and leaves, and by the fact that the inside of the corolla lacks any trace of pubescence. Also the corolla tends to be slightly longer. *S. tetonensis* occurs within the range of *S. utahensis*, but that species is immediately separated by its longer, tubular-funnelform corollas, which are pilose within, and by its puberulent leaves and twigs.

Specimens collected by S. Watson (no. 475) in Utah and Nevada in 1867, 1868, and 1869, belong to four different species, as follows: the specimens from "Virginia Mts.," Nevada, August 1867 (NY) are *S. oreophilus;* those from "E. Humboldt Mts.," Nevada, July 1868 (US) are *S. Parishii;* those from the "Wahsatch Mts.," Utah, July 1869 (NY) are *S. tetonensis;* and those from "Uintas, Utah," July 1869 (NY) belong to *S. vaccinioides.*

11. **Symphoricarpos vaccinioides** Rydberg, Mem. N. Y. Bot. Gard. **1:** 371. 1900, Fl. Colorado 324. 1906, Fl. Rocky Mts. 813. 1917; Rehder in Bailey, Stand. Cyclop. Hort. 3294. 1917; Tidestrom, Contr. U. S. Nat. Herb. **25:** 515. 1925; Rehder, Man. Cult. Trees Shrubs 812. 1927; Kirkwood, N. Rocky Mt. Trees Shrubs 296. 1930; Dayton, U. S. Dept. Agric. Misc. Publ. **101:** 152, *f. 39.* 1931; Raup, Nat. Mus. Canada Bull. **74:** 163. 1935; St. John, Fl. SE. Wash. Adj. Idaho 395. 1937.

Symphoricarpos montanus sensu Watson in Bot. King Exped. **5:** 132. 1871, ex p.; Porter & Coulter, Syn. Fl. Colorado 53. 1874, ex p. Non H.B.K. 1818.

Symphoricarpos mollis sensu Torrey in Bot. Wilkes Exped. **17:** 328. 1874. Non Nutt. ex Torrey & Gray 1841.

Symphoricarpos mollis var. *acutus* Gray, Syn. Fl. 1^2: 14. 1886, ex p.

Symphoricarpos rotundifolius sensu Gray, Syn. Fl. 1^2: 14. 1886, ex p.; Dippel, Handb. Laubholzk. **1:** 283, *f. 189.* 1889; Howell, Fl. NW. Am. 281. 1900; Jepson, Man. Fl. Pl. Calif. 967. 1925, ex p.; Tidestrom, Contr. U. S. Nat. Herb. **25:** 515. 1925, ex p.; Graham, Ann. Carnegie Mus. **26:** 341. 1937; McMinn, Ill. Man. Calif. Shrubs, 535, *f. 637.* 1939, ex p. Non Gray 1853.

Symphoricarpos Austinae Eastwood, Bull. Torr. Bot. Club **30**: 499. 1903.
Symphoricarpos acutus sensu Piper, Contr. U. S. Nat. Herb. **11**: 529. 1906; Piper & Beattie, Fl. SE. Wash. Adj. Idaho 236. 1914. Non Dieck 1888.
Symphoricarpos rotundifolius vaccinioides A. Nelson in Coulter & Nelson, Man. Bot. Rocky Mts. 471. 1909.
Symphoricarpos rotundifolius acutus Frye & Rigg, Northwest Flora 366. 1912.
Symphoricarpos oreophilus sensu Tidestrom, Contr. U. S. Nat. Herb. **25**: 515. 1925, ex p.; Dayton, U. S. Dept. Agric. Misc. Publ. **101**: 150, *f. 39*. 1931. Non Gray 1873.

A branched low shrub to 1.5 m. tall; branches dark brown, the bark smooth or shreddy; young branchlets light or yellowish brown, finely and often rather densely grayish pubescent or puberulent with short, curved hairs; leaves dark green above, somewhat paler beneath, puberulent, oval, acute or acutish at each end, 1–2 cm. long, entire, or slightly dentate, the veins conspicuous, the margins slightly thickened-revolute; petioles slender, 2–4 mm. long, dilated and somewhat connate at the base; flowers solitary or in pairs in the axils of the uppermost leaves, drooping on short pedicels; bracts lanceolate, 1.5–2 mm. long, these and the pedicels and calyces puberulent; calyx-lobes triangular, about 1 mm. long; corolla 7–8 mm. long, pink, cylindrical-campanulate, symmetrical, not at all ventricose, sparsely pilose within just above the 5 small basal nectaries, the lobes rounded, about one-third the length of the tube; anthers 1.5 mm. long, two-thirds the length of the corolla-lobes, and about equalling the filaments; style glabrous, 4 mm. long, one-half to two-thirds the length of the corolla; fruit white, about 1 cm. long, 6–8 mm. in diameter, ellipsoid; nutlets 4.5–6.5 mm. long, 2–3 mm. wide, flattened-ellipsoid, obtuse at each end, or acutish at the base.

TYPE LOCALITY: "Forks of the Madison," Montana. Collected by P. A. Rydberg and C. E. Bessey in 1897.

RANGE: British Columbia to California, and eastward to Colorado and Montana.

REPRESENTATIVE SPECIMENS: BRITISH COLUMBIA: Sophie Mt., *Macoun 64660* (NY, Mo, Can, Cal). WASHINGTON: Mt. Paddo [Adams], *Suksdorf* in 1883 (NY, Can, UC, F, paratypes); Blue Mts., *Piper 2394* (NY, US); Egbert Springs, *Sandberg & Leiberg, 367* (NY, Cal, Can, P, UI, UC, US); East of the Cascade Mts., *Wilkes Exped. 803* (US). OREGON: Bear Buttes, *Leiberg 334* (NY, F, US, UC); Siskiyou Mts., *Heller 13638* (NY, Mo, F, US); Canyon City, *Peck 10189* (NY, F); Anderson Valley, *Leiberg 2383* (NY, F, US, UC). IDAHO: Sawtooth, *Evermann 639* (NY, US, F); Soda Springs, June 22, 1892,

Mulford (NY, Mo); St. Anthony, *Quayle 85* (NY); Owyhee Co., *Macbride 478* (NY, Mo, US); Martin, *Macbride & Payson 3085* (NY, US, Mo, UC, Cal). MONTANA: Lima, *Rydberg 2795* (NY); Indian Creek, *Rydberg & Bessey 5018* (NY). YELLOWSTONE NATIONAL PARK: Mammoth Hot Springs, *Mearns 1450* (NY, US), *Scheuber 192* (NY). WYOMING: Sweetwater Co., *Nelson 7162* (NY); Hanna, *Payson & Payson 1696* (NY, Mo, Cal); Point of Rocks, *Merrill & Wilcox 455* (NY, US); North Platte River, *Pammel 2* (NY, Mo); Leucite Hills, *Merrill & Wilcox 691* (NY, US); Rocky River, *Goodding 37* (NY, US, Mo); Rawlins, *Pammel 54* (NY, Mo); Casper Mt., *Nelson 608* (NY, US, P, F, Mo). COLORADO: Horsetooth Mt., *Crandall 236* (NY); Wolcott, *Osterhout 2104* (NY); Mt. Carbon, *Eggleston 6155* (NY, US); Ouray, *Underwood & Selby 16* (NY); Pagosa Peak, *Baker 619* (NY, Mo, US); Spicer, *Goodding 1534* (NY, UC, Mo, US). UTAH: La Sal Mts., *Rydberg & Garrett 8868* (NY); southern Utah, *Parry 88* (NY, Mo); Bear Valley, *Palmer 185* (NY, US, Mo); Poison Creek, *Rydberg & Carlton 7398* (NY); Fish Creek Canyon, *Garrett 2583* (NY); Bear River, *Goodman 1839* (NY, US, Mo); Sheep Creek Canyon, *Williams 548* (NY, Cal, Mo); Wasatch Mts., *M. E. Jones 1134* (US, Cal, UC, P); Sunnyside, *Graham 9570* (US). NEVADA: Galena Creek, *Kennedy 1229* (NY, P, UC, US, Mo, UC); Wells, *E. J. Palmer 38028* (NY, Mo, US, A); Deeth, *Heller 9115, 9093* (NY, US, Mo, P); Hunter Creek Canyon, *Heller 10352* (NY, Mo, F, US); Snow Valley, *Baker 1283* (NY, Mo, Cal, Can, US, UC); Mt. Rose, *Tidestrom 10574* (US); Reno, *M. E. Jones* in 1897 (Mo, US). CALIFORNIA: Warner Mts., *Griffiths & Hunter 448* (NY, US), *J. T. Howell 12105* (Cal); Modoc Co., *Austin & Bruce 2339* (NY, UC), *Austin* in 1887 (Cal, TYPE of *S. Austinae*); Truckee, *Heller 7170* (NY, P, UC, US, Mo); Lake Tahoe, *Sonne 129* (NY, UC, F, Mo, P); Highland Lake, *Abrams 4749* (NY); Tuolumne Co., *Quick 1964* (Cal); Eldorado Co., *Heller 12512* (F, Cal, UI, US, P); Mono Pass, *Bolander 6339* (US), *Eastwood 589* (Cal); Piute Pass, *Ferris 8939* (NY, UC).

This plant was first described by Gray in 1886 as a part of his *S. mollis* var. *acutus* on the basis of a single specimen collected by Pickering & Brackenridge of the Wilkes Expedition (no. 803) in eastern Washington in 1841. This specimen lacks flowers or fruits, and, as already pointed out by Piper, has unusually narrow leaves, but this condition is matched by other specimens examined (*e.g.*, Oregon, *Leiberg 2383*). The identification of this sterile narrow-leaved specimen with *S. vaccinioides* Rydb., is rendered quite clear by a drawing of parts of the flower evidently made from fresh specimens by Pickering or Brack-

enridge in 1841 at the "1st Camp beyond Mts. to Chief's Place," and attached to an isotype sheet in the United States National Herbarium. The locality mentioned is somewhere on the eastern slope of the Cascade Mountains below Naches Pass, probably in what is now northeastern Yakima County.

The leaves of *S. vaccinoides* are as a rule sufficiently uniform to be of service in identifying sterile specimens. They are characteristically numerous, oval, acute or acutish at each end, small, and with the principal veins moderately evident. Thus, Dr. Gray's name was not altogether inappropriate, especially since he mistook the plant for a new variety of *S. mollis,* whose leaves are characteristically rounded. Rydberg (Fl. Rocky Mts.) reports *S. vaccinioides* from Alberta, but I have seen no specimens from that province. Tidestrom's inclusion of this species under the key statement "Twigs glabrous" is plainly an error, as Rydberg's type has the young twigs puberulent.

Several botanists, including Gray, Piper, and Howell, have confused this species with *S. acutus* (Gray) Dieck, but these are distinct entities belonging to different sections of the genus. *S. acutus* is a member of EUSYMPHORICARPOS, and is a trailing, subalpine shrub with villous branchlets, short, campanulate corollas, and globose fruits. It is known only from California, adjacent Nevada, and southern Oregon.

12. **Symphoricarpos Parishii** Rydb. Bull. Torr. Bot. Club **26:** 545, 1899; Hall, Univ. Calif. Publ. Bot. **1:** 122. 1902; Abrams, Bull. N. Y. Bot. Gard. **6:** 457. 1910; Parish, Plant World **20:** 255. 1917; I. M. Johnston, Plant World **22:** 118. 1919; Davidson & Moxley, Fl. S. Calif. 343. 1923; Keck, Bull. S. Calif. Acad. Sci. **25:** 72. 1926.

Symphoricarpus montanus sensu Watson in Bot. King Exped. **5:** 132. 1871, ex p. Non H.B.K. 1818.

Symphoricarpos orcophilus sensu Davidson, Cat. Pl. Los Angeles Co. 12. 1896. Non Gray 1873.

Symphoricarpos glaucus Eastwood, Bull. Torr. Bot. Club **30:** 497. 1903.

Symphoricarpos parvifolius Eastwood, ibid. 498.

Symphoricarpos rotundifolius sensu Greene, Fl. Franciscana 345. 1892; Coville, Contr. U. S. Nat. Herb. **4:** 117, 1893; Tidestrom, Contr. U. S. Nat. Herb. **25:** 515, ex p.; Jepson, Man. Fl. Pl. Calif. 967. 1925, ex p.; Munz, Man. So. Calif. Bot. 496. 1935; McMinn, Ill. Man. Calif. Shrubs 535. 1939, ex p. Non Gray 1853.

A low, spreading shrub, the branches declined, sometimes rooting at the tips, 50–100 cm. long; young twigs glaucous, sparsely pilosulous, or sometimes the internodes glabrous; bark on the older branches thin, shreddy, grayish, or sometimes reddish tinged; leaves of the flowering

branches oval, usually acute or acutish, chiefly entire, 1–2 cm. long, 5–13 mm. wide, grayish green, glaucous, paler beneath, thickish, narrowed at the base; upper surface sparsely short-pilose, the trichomes nearly straight, the lower surface paler and more glaucous, pilosulous at least along the veins and margins, or rarely the leaves completely glabrous; leaves of young shoots frequently lobed; petioles 1–3 mm. long, pilosulous; flowers chiefly in axillary pairs and in small few-flowered terminal, bracted racemes 5–10 mm. long; bracts and bractlets oval, acute, glaucous, pubescent; calyx glaucous, campanulate, the lobes scarious-margined, ciliolate, about 1 mm. long; corolla pink, elongate-campanulate, 6–7 mm. long, (rarely slightly larger), with 5 distinct basal glandular areas (nectaries), the tube pilose within, the lobes 5, slightly irregular, each 2–3 mm. long, slightly more than one-third the length of the corolla; anthers 1.5–2 mm. long, versatile, equalling or slightly shorter than the free portion of the filament; style glabrous, 3 mm. long, nearly half the length of the corolla; stigma capitate, about 1 mm. broad; fruit white, shortly ellipsoid or subglobose, 6–8 mm. in diameter; nutlets usually 2, oval, plano-convex, flattened, straw-colored, obtusish at each end, smooth or nearly so, 3.5–4.5 mm. long, 2–2.5 mm. wide.

TYPE LOCALITY: San Bernardino Mountains, California. Discovered by S. B. Parish in 1892.

RANGE: Southern California (as far north as Tulare County), and adjacent Nevada and Arizona.

REPRESENTATIVE SPECIMENS: CALIFORNIA: Tulare Co., *Purpus 1792* (UC, Cal, TYPE of *S. parvifolius*); Mineral King, *Coville & Funston 1445* (US), *Culbertson 4557* (Cal); Farewell Gap, *Culbertson 4316* (UC, NY, Cal, F, Mo); Tehachapi, *Greene* in 1889 (F); Zaca Peak, *Eastwood 750* (Cal, US); Griffins, *Elmer 3861* (NY, Mo, UC, US); Mt. Pinos, *Grinnell* in 1904 (UC), *Dudley & Lamb 4740* (UC, F); San Gabriel Mts., *Abrams & McGregor 638* (US), *Peirson 4506* (Cal); San Bernardino Mts., *Parish 2514* (NY, TYPE, F), *10940* (UC, Mo), *3024* (NY, Mo, US), *Abrams 2865* (Mo, Can, P, US), *Munz 10456* (UC), *Ewan 2759* (Cal), *M. E. Jones* in 1923 (Cal), *Grinnell 76* (UC), *Grinnell 266* (US), *Hall 7622* (UC); Bluff Lake, *Clokey 5309* (US), *Goodman & Hitchcock 1800* (Mo); San Jacinto Mts., *Condit* in 1910 (UC), *Parish 481* (F), *Hall 2485* (US, Mo, UC), *Munz 6016* (UC); Santa Rosa Mts., *Munz 5879* (UC); San Antonio Mts., *Hall 1262* (UC), *I. M. Johnston 1727* (UC). NEVADA: Stampede, *Kennedy 503* (Cal, TYPE of *S. glaucus*); Jarbidge, *Nelson & Macbride 1924* (US, Mo); Austin, *Hitchcock 652* (US); Ely, *Hitchcock 1268* (US); E. Humboldt

Mts., July 1868, *Watson 475* (US). ARIZONA: Grand Canyon of the Colorado River, *Eastwood 5718* (Cal), *Knowlton 259* (US); Williams, Coconino Co., *Barber 90* (US); Walnut Canyon, *Goldman 2090* (US); Mormon Lake, *MacDougal 58* (F, US, NY); Fort Mohave, *Lemmon* in 1884 (US); Flagstaff, *Purpus 8093* (Mo, US).

This species is locally abundant in scattered situations on dry hills in the Upper Transition and Canadian zones in the San Bernardino Mountains of California, northward into Nevada, and eastward to the Grand Canyon in Arizona. In some areas it is the dominant member of the chaparral; in other places it often forms dense spreading mats on exposed slopes. The flowering period is during June and July; the altitudinal amplitude is from 5000 to 9500 feet. It is apparently closely related to *S. vaccinioides,* but may be distinguished by the characters listed in the key. The corollas of *S. Parishii* tend to be slightly shorter than those of *S. vaccinioides,* and the shape is somewhat different — campanulate and slightly tapering to the base, instead of cylindrical- or oblong-campanulate as in the latter species; the lobes are slightly longer in proportion to the length of the tube, and the interior of the tube is pubescent throughout, the hairs extending from the upper edge of the nectaries to the base of the lobes. In the field there will be no confusion between these two entities since their ranges are widely separate.

Symphoricarpos Parishii sometimes has been confused with *S. oreophilus,* but that species is entirely different in its longer, tubular-funnelform corollas, and in its glabrous twigs and leaves. It is not known to occur in California. Specimens of *S. Parishii* from California are usually labeled *S. rotundifolius,* an entirely distinct species of Arizona and New Mexico, with the young twigs spreading-villosulous, the leaves roundish-oval, obtuse, dark green, not glaucous, and the corolla tubular-funnelform, 9–10 mm. long, with the anthers reaching scarcely beyond the base of the corolla-lobes.

13. **Symphoricarpos utahensis** Rydberg, Bull. Torr. Bot. Club **26:** 544. 1899, Fl. Colorado 324. 1906, Fl. Rocky Mts. 813. 1917; Tidestrom, Contr. U. S. Nat. Herb. **25:** 515. 1925; Rehder, Man. Cult. Trees Shrubs 812. 1927; Graham, Ann. Carnegie Mus. **26:** 342. 1937.

Symphoricarpos oreophilus utahensis A. Nelson in Coulter & Nelson, New Man. Rocky Mt. Bot. 470. 1909.

Shrub 1–1.5 m. tall; young twigs crisp-puberulent; bark on the older branches brown; leaves oval or ovate, 1.5–4 cm. long, 8–25 mm.

wide, obtuse at the apex, acutish at the base, sometimes those of the young shoots coarsely sinuately toothed or repand, green and not at all glaucous, puberulent on both surfaces; petioles puberulent, 2–4 mm. long; flowers in terminal, unilateral, drooping short spikes, or some of them in smaller clusters in the axils of the uppermost leaves; calyx-teeth glabrous or ciliolate; corolla tubular-funnelform, symmetrical, with 5 small nectaries in the base of the tube, pubescent within, 9–12 mm. long, the lobes about 3 mm. long, slightly spreading; anthers 2 mm. long, about two-thirds the length of the corolla-lobes, shorter than the filaments; style glabrous, 3 mm. long, scarcely more than one-fourth the length of the corolla; fruit white, ellipsoid, 8–10 mm. long; nutlets lanceoloid or fusiform, acute or apiculate at the base, 5–7 mm. long.

TYPE LOCALITY: Logan, Utah. Collected by P. A. Rydberg in 1895.

RANGE: Wyoming, Utah, Colorado, and northern Arizona.

REPRESENTATIVE SPECIMENS: WYOMING: Medicine Bow Mts., *C. L. Porter 1367* (US, Mo). UTAH: Salt Lake City, *Leonard 90* (NY); Bullion Canyon, *Rydberg & Carlton 7314* (NY); La Sal Mts., *Rydberg & Garrett 8613* (NY); Beaver City, *Palmer 186* (NY, Mo, F); Central Utah, *Parry 34* (NY, P); Big Cottonwood Canyon, *Garrett 6971* (F), *Rydberg 6799* (NY, Can, US); Provo, *Goodding 1117* (NY, UC, Mo, F, US); Loa Pass, *M. E. Jones 5639* (NY, UC, Mo, US); Ephraim Canyon, *Coville* in 1912 (US); Timpanogos Canyon, *Palmer 38079* (P, A); Cold Water Canyon, *Williams 629* (NY); Wasatch Mts., *Tidestrom 1909* (US), *M. E. Jones 1134* (NY), *Garrett 6506* (F); Vernal, *Harrison & Larsen, 7786* (Mo); Mt. Nebo, *Harris C27172, C2872* (Mo). COLORADO: Golden, *M. E. Jones 252* (NY); Gunnison Watershed, *Baker 384* (NY, US, UC); West Mancos Canyon, *Baker, Earle, & Tracy 312* (NY, Mo, US). ARIZONA: Navajo Indian Reservation, *Standley 7384* (US).

Symphoricarpos utahensis is said to be not uncommon on hillsides or in canyons from 6000 feet to 9000 feet altitude in Utah, Colorado, Wyoming, and northern Arizona. Perhaps most nearly related to *S. oreophilus* through the characters of the corolla, it is, nevertheless, quite distinct from that species in the pubescence of its branchlets and leaves, the shorter corolla, and in the different-shaped leaf buds. The inclusion of this species by Tidestrom under the key statement "Twigs glabrous" is due, apparently, to a misinterpretation of Rydberg's type.

14. **Symphoricarpos Palmeri**, sp. nov.

Symphoricarpos pauciflorus sensu Wooton & Standley, Contr. U. S. Nat. Herb. **19**: 610. 1915, ex p. Non *S. racemosus* var. *pauciflorus* Robbins 1867.

Symphoricarpos oreophilus sensu Palmer, Jour. Arnold Arboretum 10: 44. 1929. Non Gray 1873.

Frutex prostratus, 1–3 m. longus, ramis brevibus erectis vel ascendentibus, ramulis hornotinis pilis brevibus curvatis tomentellis puberulis; folia ovalia vel ovata, acuta, basi cuneata et sensim in petiolum attenuata, supra pilosula, subtus pilosa, reticulata; petioli teretes, 1–2 mm. longi; flores solitarii vel duo axillares; calycis dentes ovati, acuti, ciliolati, circa 1 mm. longi; corolla infundibulari-tubulosa, rosea, 9–12 mm. longa, intus pilosa, extus glabra, lobis ovalibus, tubi tertiam vel quartam partem aequantibus; stamina corollam subaequantia, antheris 2–2.5 mm. longis; stylus glaber; stigma capitatum; drupa alba, ellipsoidea, 6–8 mm. longa; nuculae 2, ovales, albae, 4–5 mm. longae, 2–3 mm. latae.

A trailing shrub 1–3 m. long, the branches short, erect or ascending; young twigs tomentulose-puberulent with short, curved trichomes; bark gray and shreddy on the older branches; leaf-buds puberulent, acute, 1–2 mm. long; leaves oval or ovate, 1–2 cm. long, 5–18 mm. wide, acute or acutish or even apiculate at the apex, cuneate at the base, the upper surface finely reticulate, dark green, pilosulous or glabrescent, the veins obscure, the lower surface paler, prominently reticulate, grayish pilosulous on the veins, the margins somewhat ciliate and usually often or less sinuate or lobulate, or crenate; leaves of the sterile branches larger, roundish oval, sinuate or crenate, or lobulate, 2–3 cm. long, 2–2.5 cm. wide, obtuse or apiculate at the apex; petioles 1–3 mm. long, pilosulous; flowers short-pedicelled, in axillary pairs or solitary; bracts lanceolate, acute, puberulent; bractlets oval, acute, puberulent; calyx glaucous, glabrous or nearly so, nearly regularly and very shallowly 5-toothed, the teeth about 0.3 mm. long; corolla pinkish, tubular-funnelform, symmetrical, 9–12 mm. long, the lobes one-fourth to one-third the length of the tube, which is pilose within on the lower part; anthers 2–2.5 mm. long, shorter than the filaments, and reaching about to the middle of the corolla-lobes; style glabrous, 2–4 mm. long; stigma capitate; fruit white, ellipsoid, 6–8 mm. long; nutlets 2, oval or ellipsoid, flattened, plano-convex, whitish, rounded at the apex, somewhat acutish at the base, 4–5 mm. long, 2–3 mm. wide.

TYPE LOCALITY: Davis Mountains, Texas. Collected by E. J. Palmer.

RANGE: Southern Colorado, Arizona, New Mexico, and western Texas.

REPRESENTATIVE SPECIMENS: COLORADO: Alder, *Ramaley & Johnson 14974* (NY). ARIZONA: Chiricahua National Forest, *Eggleston*

10849 (US); White Mountains, *Coville 1994* (US), *Hough* in 1901 (US); Navajo Co., *Peebles & Smith 13426* (US); Alto, *Fisher 36148* (US); Cuba, *Read 2* (US); Zuni Mts., *Goldman 1600, 1594* (US); Sierra Blanca Peak, *Wolf 2867* (Cal); San Antonita, *Bigelow* in 1853–4 (US). NEW MEXICO: Organ Mts., May 14, 1899, *Wooton* (NY, Mo, US); White Mts., *Wooton & Standley* in 1907 (US), *Wilkens 2404B* (P); Bear Mts., *Rusby 150* (F, UC, US, NY); St. Magdalena Mts., *Vasey* in 1881 (US, F). TEXAS: Mt. Livermore, *Palmer 30777* (Mo), *Hinckley 78* (F), *Sperry T15* (US), *Ferris & Duncan 2531* (Cal, NY), *Palmer 30853* (Mo, P, UC); Sawtooth Mt., *Palmer 31940* (US, P, Mo); Davis Mts., *Bailey 403* (US), *Palmer 34273* (NY, Mo, US, P, A, TYPE); Chisos Mts., *Palmer 34176* (Mo, NY), *Havard* in 1883 (US).

I dedicate this distinctive species to my friend and former colleague, Ernest Jesse Palmer of the Arnold Arboretum of Harvard University, who has devoted a considerable part of his life to the study of the vascular plants of the central and western parts of the United States. Mr. Palmer was the first botanist to secure an adequate series of specimens, and to publish an ecological account of the shrub. In his interesting discussion of the ligneous flora of the Davis Mountains of Texas, he says, (under *S. oreophilus*), that this species is "Found only at the higher altitudes above approximately 2100 m., where it grows on banks and rubble. The rather large pinkish flowers are borne in great profusion and are followed by an abundance of white berries. The plant trails or inclines over banks, and grows in great luxuriance in certain favorable localities." According to herbarium labels it grows on shaded banks of canyons, or about springs, or in deep rocky ravines, and flowers in June or July.

The character of the flowers and leaves relate this species to *S. utahensis*, from which it differs in having a trailing rather than an erect habit, smaller, usually more or less sinuate leaves, and the type of pubescence is more of the pilosulous order, rather than merely puberulent with short curved trichomes as in *S. utahensis*. Additional phylogenetic characters are to be found in the very different nutlets of the two species. It is somewhat similar to *S. oreophilus*, and has been mistaken for a "pubescent form" of that species. *Symphoricarpos Palmeri* is apparently confined to the mountains of Arizona, southern Colorado, adjacent New Mexico, and western Texas.

15. **Symphoricarpos oreophilus** Gray, Jour. Linn. Soc. Bot. **14**: 12. 1873, in Brewer & Watson, Bot. Calif. **1**: 279. 1876; Coulter, Man. Bot. Rocky Mt. Reg. 125. 1885; Gray, Syn. Fl. 1^2: 14. 1886;

Dippel, Handb. Laubholzk. **1**: 284, *f. 190.* 1889; Greene, Fl. Franciscana 345. 1892; Howell, Fl. NW. Am. 281. 1900; De Wildeman, Ic. Hort. Thenens. **3**: 69–72, *pl. 98.* 1902; Rydberg, Fl. Colorado 324. 1906; Schneider, Ill. Handb. Laubholzk. **2**: 674, *f. 430, f-1, f. 428, q-t.* 1911; Bean, Trees Shrubs Hardy Brit. Isles **2**: 563. 1914; Wooton & Standley, Contr. U. S. Nat. Herb. **19**: 611. 1915; Armstrong, Field Book W. Wild Fl. 517. 1915; Rehder in Bailey, Stand. Cyclop. Hort. 3293. 1917; Rydberg, Fl. Rocky Mts. 814. 1917; Tidestrom, Contr. U. S. Nat. Herb. **25**: 515. 1925; Rehder, Man. Cult. Trees Shrubs 812. 1927; Longyear, Trees Shrubs Rocky Mt. Reg. 218, *f. 120.* 1927; Kirkwood, N. Rocky Mt. Trees Shrubs 296. 1930; Krüssmann, Laubgehölze 315. 1937; Van Dersal, U. S. Dept. Agric. Misc. Publ. **303**: 268. 1938.

Symphoricarpus vulgaris sensu Gray in Plantae Fendler. 60. 1848. Non Michx. 1803.

Symphoricarpos montanus sensu Gray, Am. Jour. Sci. ser. 2. **34**: 249. 1862; Watson in Bot. King Exped. **5**: 132. 1871, ex p.; Porter & Coulter, Syn. Fl. Col. 53. 1874, ex p. Non H.B.K. 1818.

Symphoricarpos rotundifolius var. *orcophilus* M. E. Jones, Proc. Calif. Sci. ser. 2. **5**: 690. 1895.

Symphoricarpos glabratus Eastwood, Bull. Torr. Bot. Club **30**: 499. 1903.

An erect shrub 1–1.5 m. tall, divaricately branched; branches slender, spreading, the bark becoming brown and shreddy; young branchlets completely glabrous; leaves oval, rather thin, perfectly glabrous on both surfaces (or very rarely with a few short, scattered trichomes), usually acutish at the apex, entire or dentate, scarcely paler beneath, those of the flowering branches 1–2.5 cm. long, 8–16 mm. broad, tapering to the very short petiole; petioles broader at the base, about 2 mm. long, enclosing the pointed buds; flowers rose, mostly in axillary pairs, or in few-flowered terminal spikes; bracts oval, acute, connate at the base, glabrous, 1 mm. long; calyx glabrous, the lobes deltoid, 0.5–1 mm. long; corolla tubular-funnelform, 11–13 mm. long, symmetrical, the tube slender, sparsely pilose to nearly glabrous within, and with 5 small basal nectaries, the lobes 2–3 mm. long, slightly spreading, less than one-fourth the length of the tube; anthers 2 mm. long, about two-thirds the length of the corolla-lobes and about as long as the filaments; style glabrous, 3 mm. long, about one quarter the length of the corolla; stigma capitate; fruit white, ovoid or ellipsoid, 8–10 mm. long; nutlets flattened-lanceoloid, 5–6 mm. long, 2–2.5 mm. wide, tapering to the acute base, obtusish at the apex.

TYPE LOCALITY: At the headwaters of South Clear Creek and the

alpine ridges east of Middle Park, Rocky Mountains, Colorado. Collected by C. C. Parry (no. 223) in 1861.

RANGE: Colorado, Utah, Nevada, Arizona, New Mexico, and Sonora, Mexico.

REPRESENTATIVE SPECIMENS: COLORADO: Idaho Springs, *Nelson 10950* (Mo); Canyon City, *Brandegee 47* (UC); Clear Creek, *Hall & Harbour 225* (P, F, US, Mo); "Upper Arkansas," *Porter* in 1872 (P); S. Colorado, *Brandegee* in 1872 (P); Ouray, *Underwood & Selby 26* (NY); Montrose, *Rollins 1600* (NY); Paradox Creek, *Walker 233* (NY, Mo, US); Fishers Peak, *Beckwith 175* (NY); Golden, *Cary 156* (US), *Knowlton 78* (US), *Pammel 307* (Mo); Trinidad, *Beckwith 207* (NY), *Eastwood* in 1891 (Cal, TYPE of *S. glabratus*); Gunnison, *Clements 228* (NY); Steamboat Springs, *Shear & Bessey 3974* (NY); Norwood Hill, *Walker 425* (NY, US, Mo); Turkey Creek, *Rydberg & Vreeland 5579* (NY, Can); Gilpin Co., *Tweedy 5540* (NY); Durango, *Eastwood* in 1891 (NY); Rocky Mts., *Parry 223* (P, Mo). UTAH: Salt Lake City, *Rydberg 6260* (NY); Marysvale, *Rydberg & Carlton 7132* (NY); Poison Creek, *Rydberg & Carlton 7438* (NY); Red Butte Canyon, *Garrett 2493* (NY). NEVADA: Ruby Mts., *Eggleston 7709* (NY, US). ARIZONA: San Francisco Mt., *Rehder 70* (A, US); Winona, *Goldman 2855* (US); Rincon Mts., *Blumer 3415* (Mo, UC, F); Tucson, *Fisher 219* (P); Willow Spring, *Palmer 521* (US); Mt. Graham, *Kearney & Peebles 9789* (US); Kaibab Plateau, *Eastwood & Howell 6406B* (Cal); Chiricahua Mts., *Goodman & Hitchcock 1218* (Cal, UC, P, NY, F, Mo), *Witmer Stone 304* (P); Huachuca Mts., *Goodding 131, 867* (NY); Santa Rita Mts., *Pringle* in 1884 (NY, P, US, F, Mo); Cooley Butte, *Coville 512* (NY), *1112* (US); Santa Catalina Mts., *Shreve 5312* (UC), *Livingston & Thornber* in 1901, (NY), *Harris C16302* (NY), *Lemmon* in 1905 (UC). NEW MEXICO: Cimarron Canyon, *Nelson & Nelson 422* (UC); Cloudcroft, *Wooton* in 1899 (US); Tunitcha Mts., *Standley 7684* (US); Chama, *Standley 6668* (US); Sandia Mts., *Eastwood 15675a* (Cal), *Ellis 60* (Mo, US); Brazos Canyon, *Standley & Bollman 10777* (US); Turkey Mt., *Harris 17* (US); White Mt., *Wooton* in 1895 (US); Santa Fe Creek, *Fendler 284* (Mo); Sacramento Mts., *Rehder 366* (NY, A); Winsors Ranch, *Standley 4065* (NY, Mo, US); Mogollon Mts., *Metcalfe 314* (NY, US, UI, UC, Mo); Sierra Co., *Metcalfe 994* (US, NY, F); Jemez Springs, *Nelson 11682* (NY, US, Mo). TEXAS: Guadalupe Park, *Moore & Steyermark 3671* (UC, NY, Mo, P). MEXICO: San Jose Mts., Sonora, *Mearns 1588, 1643* (US), *Wolf 2508* (Cal).

By the elongated, tubular-funnelform corolla, glabrous twigs and foliage, and the long, flattened-lanceoloid sharp-based nutlets, this characteristic shrub of the southern Rocky Mountain region can be readily distinguished from all other members of the genus. *Symphoricarpos tetonensis*, the only species for which this might be mistaken, differs in its shorter, cylindrical-campanulate corollas, and the smaller, obtusish nutlets.

As in most of the other species of this genus, the leaves of the young shoots are extremely variable in size, and extent of lobation. On the same branch they may vary from entire to dentate, or they may be many-lobed with the lobes sometimes reaching half way to the midvein, usually deeper on the lower half of the blade, and thus frequently giving the leaf a somewhat oak-like appearance. The blades are from 1–4 cm. long and wide, or occasionally slightly larger. The upper surface is pale or glaucous green and finely reticulate with the numerous veinlets impressed; the lower surface is paler green, with the principal veins rather prominent.

The herbarium specimens distributed as *Heller 3591* from Barranca, Taos County, New Mexico, consist of a mixture of *S. oreophilus* and *S. Palmeri*. For example, US and Mo sheets belong to *S. oreophilus;* those from F and UI are *S. Palmeri*. They are all good flowering specimens and the specific identity can be determined at a glance by the length of the corollas and the indument of the leaves and young twigs.

16. **Symphoricarpos rotundifolius** Gray, Plantae Wrightianae **2:** 66. 1853, Jour. Linn. Soc. Bot. **14:** 11. 1873, in Brewer & Watson, Bot. Calif. **1:** 279. 1876; Hemsley, Biol. Centr.-Am. **2:** 4. 1881; Gray, Syn. Fl. 1^2**:** 14. 1886; Greene, Fl. Franciscana 345. 1892; Koehne, Deutsche Dendrol. 557. 1893; Rydberg, Fl. Colorado 324. 1906; Coulter & Nelson, New Man. Bot. Rocky Mts. 470. 1909; Garrett, Spring Fl. Wasatch Reg. 91. 1911; Schneider, Ill. Handb. Laubholzk. **2:** 674, 1911; Bean, Trees Shrubs Hardy Brit. Isles **2:** 564. 1914; Wooton & Standley, Contr. U. S. Nat. Herb. **19:** 611. 1915; Rehder in Bailey, Stand. Cyclop. Hort. 3293. 1917; Rydberg, Fl. Rocky Mts., 813. 1917; Standley, Contr. U. S. Nat. Herb. **23:** 1399. 1924; Tidestrom, Contr. U. S. Nat. Herb. **25:** 515. 1925; Longyear, Trees Shrubs Rocky Mt. Reg. 217, *f. 119b*. 1927; Rehder, Man. Cult. Trees Shrubs 812. 1927; Dayton, U. S. Dept. Agric. Misc. Publ. **101:** 152. 1931; Munz, Man. S. Calif. Bot. 495. 1935; Krüssmann, Laubgehölze 315. 1937; Van Dersal, U. S. Dept. Agric. Misc. Publ. **303:** 269. 1938.

Symphoricarpos montanus sensu Watson, Bot. King Exped. **5**: 132. 1871; Porter & Coulter, Syn. Fl. Colorado 53. 1874, ex p. Non H.B.K. 1818.

A low, erect, slender, straggling shrub less than 1 m. tall; young branches softly and densely pubescent with short, straight, spreading hairs; leaves 1–3 cm. long, 6–18 mm. wide, grayish green, suborbicular to broadly oval or ovate, obtuse or rounded at the apex, rarely acutish, usually entire, or some of the larger ones repand or sinuately dentate or lobed, decidedly pubescent, usually puberulous above, pilosulous and grayish beneath; petioles 1–3 mm. long, densely short-villous; flowers almost sessile in the axils of the upper leaves; bracts shorter than the ovary; corolla light pink, tubular-funnelform, symmetrical, 9–10 mm. long, the tube pilose within on the lower part, and with 5 small glandular nectaries in the base, the lobes 2 mm. long, slightly spreading; calyx campanulate, the lobes about 1 mm. long; anthers 2–2.5 mm. long, reaching only to the base of the corolla-lobes, equalling or somewhat shorter than the free portion of the filament; style glabrous, 3–4 mm. long, about one-third the length of the corolla; fruit white, ovoid or ellipsoid, about 1 cm. long, 6–7 mm. wide; nutlets oval, flattened, striate, pointed at each end, 4.5–5 mm. long, 3 mm. wide.

TYPE LOCALITY: "Sides of mountains around the copper mines," Santa Rita, New Mexico. Collected in August, 1851, by Charles Wright, no. 1388.

RANGE: New Mexico, Arizona, and southern Colorado.

REPRESENTATIVE SPECIMENS: COLORADO: Canyon City, *Brandegee 47* (Mo); Grand Canyon of the Arkansas, *Engelmann* in 1874 (Mo). ARIZONA: near Prescott, *Toumey 200a* (US), *Sparks* in 1902 (US), *McKelvey 1210* (US), *Eastwood 17644* (Cal), *Wolf 2320* (Cal), *Kearney & Peebles 9754* (US); Matzatzal Mts., *Collom 300* (NY, Mo); Fort Whipple, *Coues & Palmer 242* (Mo); Pinal Mts., *M. E. Jones* in 1890 (Mo, UC); Oak Creek Canyon, *Goddard 584* (UC, F), *Rehder 45* (Mo), *Nelson & Nelson 2084* (Mo), *Goldman 2176* (US); Navajo Reservation, *Darsie* in 1933 (Cal), *Vorhies* (UC, Mo). NEW MEXICO: Copper Mines, *Parry 421* (NY, US); *Wright 1388* (NY, TYPE, Mo, P, US); Organ Mts., *Standley* in 1906 (US), *Wooton & Standley* in 1906 (US); Bear Mountain, *Metcalfe 76* (Mo, UI, US, UC); Animas Mts., *Goldman 1391, 1392* (US); Santa Fe, *Mulford 1272* (Mo); valley of the Rio Grande, *Parry 421* (US).

Symphoricarpos rotundifolius is a rather local species confined to the mountainous areas of southwestern New Mexico, Arizona, and adjacent Colorado, where it occurs on rocky slopes between the altitudes of 4000

and 10,000 feet. It is very similar in the shape of the leaves and in the character of the pubescence to the Californian *S. mollis,* but that is a trailing shrub with shortly campanulate corollas. In the original description of *S. rotundifolius,* Gray says: "The leaves are rounded and more downy than in Nuttall's *S. mollis,* and the inflorescence as well as the shape of the corolla is entirely different."

S. rotundifolius can be readily distinguished from all other species of the subgenus ANISANTHUS by the fact that the pubescence of the young twigs is dense, spreading, and villosulous. In this respect it is entirely different qualitatively from all the other species within its cycle of affinity. This character, in combination with the tubular-funnelform corolla 9–10 mm. long, will readily distinguish it from every other species. It has been the custom, however, for nearly half a century to confuse this shrub with a more common member of the genus that has a northerly range, *S. vaccinioides,* but as long ago as 1900, when he first described that species, Rydberg pointed out quite clearly that "all the specimens from the northern Rockies referred to either *S. oreophilus* or *S. rotundifolius,* belong to *S. vaccinioides.*" Nevertheless, even during the last decade, several botanists have not distinguished between *S. vaccinioides* and the entirely different *S. rotundifolius,* but instead have grouped their specimens under this latter species, which is not known to occur north of latitude 39° N.

The type locality, according to a statement in the original description of *S. rotundifolius,* is near Santa Rita, New Mexico. Wright's specimens were collected in August 1851, hence, according to Gray's account in the introduction to the second part of Plantae Wrightianae, they were collected "during a journey from El Paso to the copper mines of Santa Rita del Cobre, in the southwestern part of New Mexico, . . ."

17. **Symphoricarpos longiflorus** Gray, Jour. Linn. Soc. Bot. **14:** 12. 1873, in Brewer & Watson, Bot. Calif. **1:** 279. 1876, Syn. Fl. **1**[2]**:** 14. 1886; Coville, Contr. U. S. Nat. Herb. **4:** 117. 1893; Brandegee, Zoe **5:** 149. 1903; Schneider, Ill. Handb. Laubholzk. **2:** 675. 1911; Armstrong, Field Book West. Wild Fl. 517. 1915; Rehder in Bailey, Stand. Cyclop. Hort. 3294. 1917; Rydberg, Fl. Rocky Mts. 814. 1917; Jepson, Man. Fl. Pl. Calif. 967. 1925; Tidestrom, Contr. U. S. Nat. Herb. **25:** 515. 1925; Munz, Man. So. Calif. Bot. 495. 1935; McMinn, Ill. Man. Calif. Shrubs 535, *f. 638.* 1939.

Symphoricarpos fragrans A. Nelson & Kennedy, Muhlenbergia **3:** 143. 1908.

A low spreading shrub, the branches somewhat declined, 50–100 cm. long; young twigs glaucous, glabrous, or sparsely pilosulous; bark of the older branches thin, whitish, fibrous, shreddy; leaves lanceolate to oval or oblanceolate, acute to obtuse at the apex, narrowed at the base, entire, 6–15 mm. long, 2–5 mm. wide, completely glabrous to sparsely pilosulous, thick, pale green and glaucous; petioles 1–3 mm. long, glabrous or ciliate; flowers solitary or in pairs in the axils of the upper leaves, or in small terminal, few-flowered racemes, very fragrant; calyx 5-lobed, glabrous and glaucous, or somewhat pubescent, the lobes deltoid, about 1 mm. long; corolla 11–13 mm. long, salverform, symmetrical, pink, the tube narrow, 3–5 times as long as the widely spreading lobes, glabrous inside and out, with one small basal nectary; stamens about as long as the tube of the corolla, the anthers versatile, sessile or nearly so, 2–3 mm. long, about one-fourth the length of the lobes of the corolla, the filaments scarcely if at all free; style 5–7 mm. long, usually pilose above the middle; stigma capitate or slightly bilobed; fruit white, ellipsoid, 8–10 mm. long; nutlets 2, oval, glabrous, 4.5–5 mm. long, 2.5–3 mm. wide, acute at the base.

TYPE LOCALITY: Pahranagat Mountains, southeastern Nevada. Collected by Miss Searles in 1871.

RANGE: Southeastern Oregon to Colorado, Texas, and southeastern California.

REPRESENTATIVE SPECIMENS: OREGON: Trout Creek, *Percy Train 35* (US). NEVADA: Charleston Mts., *Clokey 7732* (US, F, NY, Cal); Ely, *Hitchcock 1231* (US); Rabbit Hole, *Griffiths & Hunter 541* (NY, US); Silver Peak Mts., *Goldman 2580* (US); Mormon Mts., *Kennedy & Goodding 122* (UC, US); Peavine, *Bailey 110* (US); Currant, *Bentley 67* (Mo, NY); Truckee, *Kennedy 1590* (F, P, US, UC, NY, Mo, ISOTYPES of *S. fragrans*), *Kennedy 2012* (UC, Mo, P), *Kennedy 1313* (UC); Goldfield, *Heller 10409* (Mo, NY, US, Cal, F); Pioche, *Minthorn* in 1909 (UC); Candelaria, *M. E. Jones* in 1897 (US, P, Mo); Caliente, *Tidestrom 9487* (NY, US). CALIFORNIA: Topaz, *Bolton* in 1915 (Cal); Argus Peak, *Purpus 5480* (UC, US, Mo); Providence Mts., *Munz, Johnston & Harwood 4388* (US); Death Valley, *Coville & Funston 941* (US); Panamint Mts., *Howell 3895* (Cal), *Munz 14839* (Cal, Mo), *Hoffman 451* (Cal), *Ferris 7966* (Mo, F, UC); Bishop, *Heller 8274* (Mo, F, P, Cal, NY, US); White Mts., *Duran 2648* (US, NY, Cal, F, Mo, UC), *Tidestrom 9949* (US, F); Clark Mt., *Munz 12892* (UC). UTAH: Santa Clara Valley, *M. E. Jones 5137* (UC, NY, US, Mo); near St. George, *Parry 87* (US, Mo, F); Diamond Valley,

Goodding 838 (UC, NY, Mo, US); Bear River, *Greenman 4623* (Mo); Richfield, *Ward 179* (US, Mo, P); Smithsonian Butte, *M. E. Jones 5264a* (US); Fruita, *Harrison 7383* (Mo); La Verkin *Maguire & Blood 4483* (Mo, UC); Sevier River Canyon, *Eastwood & Howell 627* (Cal). COLORADO: western Montrose Co., *Payson & Payson 3923* (Mo). ARIZONA: Pagumpa, *M. E. Jones* in 1894 (US); Peach Springs, *Wilson* in 1893 (Cal, UC); Grand Canyon, *Eastwood 5749* (Cal). TEXAS: Guadalupe Mts., *Moore & Steyermark 3478* (UC, NY, Mo, P, Cal, US), *Standley 40538* (US, NY).

This distinctive species is not uncommon on rocky slopes and hillsides in the foothills and canyons of the artemisia, pinyon, and yellow pine belts in southwestern United States, from 4500 to 7500 feet altitude, flowering in May and June. The leaves and young twigs vary from completely glabrous, which is the usual condition, to sparsely pilosulous. This variation is apparently not correlated with any other character, or with any distinct geographical distribution. Gray's type is completely glabrous, a fact noted in the original description as "Fere glaberrimus." The plants described by Nelson & Kennedy do not differ in any detectable respect from *S. longiflorus*. Their comparative statement, applied to *S. fragrans*: "Plainly a northern ally of *S. longiflorus*, from which it differs in the size of its leaves, and the size, character, and color of the flowers," can be interpreted only on the assumption that they were comparing it with some plant other than *S. longiflorus*, because, as noted above, there is no difference in the size of the flowers, neither are there any distinctive leaf characters.

DEPARTMENT OF BOTANY,
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NEW PHANEROGAMS FROM MEXICO, III*

IVAN M. JOHNSTON

Aristolochia Wrightii Seemann, Bot. Voy. Herald 331, tab. 72 (1856).

A. brevipes var. *Wrightii* (Seem.) Duchartre in DC. Prodr. 15[1]: 441 (1864).

DURANGO: Mapimi, side of arroyo, Oct. 1898, *Palmer 540* (G). COAHUILA: Torreon, Feb. 1905, *Purpus 1057* (G); 6 mi. west of Viesca, steep open canyon on limestone cliffs, Sept. 1938, *Johnston 7746* (G).

During the cruise of the "Herald," Seemann visited the city of Durango and in the vicinity collected an *Aristolochia*. In his report on the plants collected, he treated his plant as a new species, describing and beautifully illustrating it as *Aristolochia Wrightii*. In addition to his own collection (*Seemann 2175*) he referred to his new species, material from "Zacatecas" collected by Hartweg, and four collections near the Mexican boundary made by Wright (nos. *567*, *568*, *1700* and *1701*).

I have not seen Seemann's plants but the excellent illustration shows that it is conspecific with the Mexican plants that I have cited above. The collection by Hartweg, cited by Seemann, is probably *Hartweg 85* and hence really from Aguas Calientes. It is the type of *A. brevipes* Benth., Pl. Hartweg. 15 (1839). Hartweg is not known to have visited Zacatecas. Bentham, in his account of the Hartweg collections, lists no other *Aristolochia* from central Mexico. Charles Wright's collections, as represented at the Gray Herbarium, consist of the following material,—567 *A. Coryi* Johnston, an assemblage of two collections from Val Verde Co., Texas; 568 *A. Wrightii* var. *texana* Johnston from the Davis Mountains, Jeff Davis Co., Texas; 1700 *A. Coryi* from near the present town of Brackettville, Kinney Co., Texas, plus a spray of *A. Wrightii* var. *texana* of unknown provenance; and 1701, *A. Watsonii* Woot. & Standl. from between Wilcox Playa and Benson, Cochise Co., Arizona.

It is evident that, as he accepted it, Seemann's species is an aggregate. Though it was "named in honor of the zealous and indefatigable traveller, Mr. Charles Wright," I am accepting Seemann's material from Durango as the type of his species. This was obviously his best material and

*New Phanerogams from Mexico, II. See Jour. Arnold Arb. 21: 67–75 (1940).

certainly his chief concern when the species was proposed, and, furthermore, it was the material selected for illustration.

Botanists subsequent to Seemann have treated his *A. Wrightii*, at best, as only a variety of *A. brevipes* Benth. Typical *A. brevipes*, however, is not known north of San Luis Potosi and southern Durango. Seemann's species is a much coarser plant with an evident, usually tawny, velutinous indument. Its leaves are distinctly larger and auriculate-lobed. The perianth is 2–3 times as large, glabrous within and very hairy outside, more irregular and firmer in texture. It ranges along the eastern base of the Sierra Madre Occidental, in Durango and southwestern Coahuila, north of the range of *A. brevipes*. In a form, distinguished only by its consistently smaller perianth, the species extend north into Chihuahua and western Texas. This northern smaller plant may be characterized as follows,—

Aristolochia Wrightii, var. **texana**, var. nov.

A forma typica differt perianthiis minoribus 3.5–4 cm. (non 6–7 cm.) longis.

Chihuahua: rocky hills near Chihuahua, Apr. 1885, *Pringle 9* (G); 8 miles northwest of Cruces, base of sandstone cliff, Sept. 1938, *Johnston 7986* (type, Gray Herb.). Texas (Jeff Davis Co.): valley of the Limpia, Aug. 22, 1849, *Wright 868* (G); mountainside on the Limpia, June 26, 1852, *Wright sine no.* (G); Davis Mts., Apr. 1902, *Tracy & Earle 171* (G); Ft. Davis, dry rocky ravines along Limpia Cr., June 1928, *E. J. Palmer 34485* (G).

The usually tawny velutinous indument of the herbage and the velvety elongate perianth permits this Texan and Chihuahuan plant to be instantly distinguished from either *A. Coryi* Johnston, of the margin of the Edwards Plateau, Texas, or from *A. Watsonii* W. & S. of southeastern Arizona, adjacent New Mexico, and Sonora, the two other species of the Mexican boundary which have been improperly treated as phases of the truly Mexican, *A. brevipes*.

Aristolochia Whitei, sp. nov.

Herba perennis prostrata e radice ut videtur profundo et crasso oriens; caulibus numerosis subsimplicibus basim versus longe ramosis ad 2 dm. longis ca. 1 mm. crassis, internodiis 1–1.5 cm. longis; foliis supra puberulentis sublaevibus basim versus purpureo-maculatis, subtus praesertim secus costam et nervos pilos rigidulos e basi incrassata orientes gerentibus 5-costatis; lamina foliorum infimorum triangulari-cordata 5–12 mm. longa et lata; laminis foliorum medialium et superiorum elongatis majori-

bus basi late divergenteque auriculatis (ergo trilobis) ad 2.5 cm. longis et 1.5 cm. latis, lobo centrali basim versus 6–9 mm. lato ad 2 cm. longo sursum contracto, foliis basi excisis, sinu 2–4 mm. profunde et 4–6 mm. late inter auriculas amplas rotundas aperto; petiolo ad 5 mm. longo; floribus in axillis solitariis; pedunculo 1–1.5 cm. longo conspicuo apice bracteam 5–10 mm. longam gerente; ovario ca. 5 mm. longo clavato vel subcylindrico breviter velutino in stipitem 5–8 mm. longum gradatim attenuato; perianthio ca. 2 cm. longo extus praesertim secus nervos villoso; utriculo 4–5 mm. longo intus glabro; tubo 7–10 mm. longo subcylindrico subrecto vel saepe leviter falcato-curvato intus praesertim infra medium sparse piloso; limbo parvo 6–9 mm. longo triangulari acuminato viridi haud conspicuo unilaterali erecto intus pilis purpureis obsito; gynostemio ca. 1.8 mm. longo ca. 1.5 mm. crasso 5-mero ca. 0.5 mm. longe stipitato; fructu immaturo depresso ca. 9 mm. crasso et 5 mm. alto in basim conicam ca. 4 mm. longam (apicem versus 2.5 mm. crasso) abruptissime contracto deinde in stipitem fere ad 16 mm. longum transmutato.

CHIHUAHUA: 20 mi. west of Chihuahua on road to Santa Isabel, ca. 5700 ft., prostrate, fl. greenish, Aug. 20, 1939, *Stephen S. White 2469* (TYPE, Gray Herb.).

This is a relative of *A. brevipes* Benth., of central Mexico. It differs in its slightly curved perianth-tube, poorly developed triangular perianth-limb, very elongate peduncles, relatively well developed cordate bracts, long-stiped ovary and purple-spotted leaves. The species is well marked. It is, however, much more closely related to true *A. brevipes* than are the other plants of Coahuila, Chihuahua and Sonora, and adjacent United States, which have been improperly, though very generally, identified with that southern plant. Its range lies between that of *A. Wrightii* Seem. and *A. Watsoni* Woot. & Standl., but differs widely from these two species in its small purple-spotted leaves, long peduncles and small subtubular short-limbed perianth. Its leaves are greener and much less hairy than in *A. Wrightii* and grayer and more hairy than in *A. Watsonii*.

Aristolochia lassa, sp. nov.

Herba prostrata multicaulis e radice palari carnoso fusiformi erumpens; caulibus basim versus ramosis 1.5–3 dm. longis ca. 1 mm. crassis, internodiis 7–12 mm. longis; foliis saepe 12–24 mm. longis sparse hispidulo-villosulis (infimis minoribus subcordatis) medialibus et superioribus trilobatis basim versus latioribus saepe 10–18 mm. latis basi laminae excisa, sinu 2–5 mm. profunde obtuso inter auriculas saepe 4–5 mm. longas ovatas divergentes late aperto; petiolo 2–4 mm. longo; flori-

bus in axillis solitariis; pedunculo 1–4 mm. longo bracteis foliaceis lanceo-ovatis 2–6 mm. longis terminato; ovario ad anthesin ad 5 mm. longo velutino subsessili; perianthio ca. 1.5 cm. longo extus plus minusve hispidulo-villosulo; utriculo ca. 5 mm. longo supra medium 3–4 mm. crasso intus supra medium villoso; tubo infra medium abrupte geniculato (angulum 80°–90° latum formante) intus supra medium sparse villoso imam ad basim 2.5–3 mm. crasso, supra geniculum cylindrico ca. 2 mm. crasso 4–5 mm. longo; limbo valde obliquo angulo ad 30° ab axi partis superioris tubi divergente ca. 1 cm. longo ad 5 mm. lato (basim versus latiore) late lanceolato os tubi undique ambiente basi plus minusve emarginato supra (praesertim marginem versus) sparse villoso; gynostemio 5-mero ovoideo 1.5–1.8 mm. longo ca. 0.4 mm. longe stipitato; capsula obovoidea 1–1.4 mm. longa apice truncata basi 1–2 mm. longe stipitata.

COAHUILA: Saltillo, common in bottom lands, prostrate, fl. maroon with crimson shade, base greenish yellow, May 1898, *Palmer 187* (TYPE, Gray Herb.); mountains 40 miles south of Saltillo, July 1880, *Palmer 1183* (G).

The present plant seems to be most closely related to the plant collected by Karwinsky (no. 712, from "Mexico") and later described as *A. Karwinskii* Duchartre, in DC. Prodr. 15[1]: 442 (1864). Duchartre gives the leaves of *A. Karwinskii* as 3.2–3.5 dm. long and about 2.8 dm. wide on a petiole 8–10 mm. long. The measurements of the leaf-blade are incongruously disproportionate to the other measurements and details given. It seems probable that a decimal point was misplaced and that the blade is probably only 3.2–3.5 cm. long and 2.8 cm. wide. In any case the leaves are larger than in *A. lassa* and are subreniform or deltoid-cordate rather than distinctly auriculate and hence trilobed. In *A. Karwinskii* the perianth is larger (8 cm. long) and has a deltoid-cordate limb (2.5 cm. long and 1.5 cm. wide) which is deeply incised at the base. The type was probably collected, during Karwinsky's second Mexican expedition, in southwestern Tamaulipas and perhaps in the region about Jaumave, Palmillas and Santiaguillo where, in 1842 and 1843, the major part of his collection was obtained.

Aristolochia Coryi, sp. nov.

Herba perennis prostrata e radice profundo fusiformi succulento oriens; caulibus pluribus gracilibus saepe basim versus ramosis elongatis 1–4 dm. longis 1–1.5 mm. crassis sparse hispidulo-villosis, internodiis 1–3.5 cm. longis; foliis viridibus conspicue auriculatis (ergo trilobatis) 1.8–5 cm. longis 1–4 cm. latis, margine ciliolatis, subtus sparse incon-

spicueque villosis, supra sparse inconspicuissimeque villosis vel villoso-hispidulis; parte centrali laminae anguste triangulari basim versus 5–15 mm. lata deinde apicem versus gradatim attenuata ab apice petioli usque ad apicem laminae 1–4 cm. longa; lamina basi excisa, sinu profundo obtuso inter auriculas amplas 5–15 mm. longas 3–11 mm. latas rotundas divergentes late aperto donata, petiolo 5–25 mm. longo; floribus in axillis solitariis; pedunculo 1–8 mm. longo bractea foliacea ovata 4–10 mm. longa acuta basi rotundata perbreviter petiolata terminato; ovario ad anthesin 5–7 mm. longo velutino apice ad 1 mm. crasso deinde deorsum gradatim contracto 1–3 mm. longe stipitato; perianthiis 2–3.5 cm. longis extus plus minusve villosulis; utriculo 2.5–6 mm. crasso 4.5–7.5 mm. longo supra medium crassiore subasymmetrico intus glabro; tubo leviter falcato-curvato 10–15 mm. longo 2–3 mm. crasso intus supra medium (praesertim apicem versus) pilifero; limbo valde obliquo os tubi undique 2–4 mm. late ambiente late elliptico 10–18 mm. longo (in alabastro a latere viso lunato) basi plus minusve emarginato, facie interiore saepe glabro; gynostemio 5-mero 2.3 mm. alto obovoideo-obconico apice 1.8 mm. crasso ca. 0.6 mm. longe stipitato; capsula angulata elliptica vel obovoidea vel depresse globosa 10–13 mm. crassa ca. 12 mm. longa 2–4 mm. longe stipitata.

TEXAS: Substation no. 14, Edwards Co., June 8, 1934, *V. L. Cory 8491* (TYPE, Gray Herb.); "on the llano," May 1885, *Reverchon 129* (G); stony prairies, Chicon Cr. to Piedra Pinta Cr. [i.e. near Brackettville, Kinney Co.], May 17, 1851, *Wright 1700* (G); Big Bend of Devils River, limestone hills, Val Verde Co., July, *Wright* (G); prairies of San Felipe Cr. & in bottoms of Devils River, Val Verde Co., July 17 and 25, 1849, *Wright 567* (G).

This very well marked species has passed as one of the forms of *A. brevipes* Benth. The broadly elliptic limb of the perianth, however, quickly distinguishes *A. Coryi* from *A. brevipes* and its relatives. The species ranges along the southern margin of the Edwards Plateau, of western Texas. It is well separated from *A. Wrightii* var. *texana* Johnston, of northern Chihuahua and trans-Pecos Texas (Davis Mts.), the only true relative of the central Mexican, *A. brevipes*, that approaches it geographically. The more hairy, usually somewhat velvety and tawny, herbage of *A. Wrightii* and its velvety unilabiate corolla with a very elongate narrow limb, are characters permitting *A. Wrightii* to be distinguished at a glance from *A. Coryi*.

Talinum Whitei, sp. nov.

Planta laxe ramosa, partibus inferioribus ignotis; ramis saltem 5 dm.

longis ad 4 mm. crassis herbaceis foliosis supra medium floriferis infra medium ramulos 1–3 dm. longos ascendentes supra medium floriferos gerentibus, internodiis saepe 2–3 cm. longis; foliis oblanceolatis compressis saepe 3–6 cm. longis 7–15(–20) mm. latis supra medium latioribus deinde basim versus in petiolum 1–3 mm. longum gradatim attenuatis apicem obtusum versus contractis costa et nerviis obscure notatis; inflorescentia elongata racemoso-paniculata ca. 3–4 mm. crassa et 1–2 dm. longa, foliis sursum gradatim reductis ornata; pedunculis ad 2 cm. (saepe 5–10 mm.) longis apice bracteas duas ovatas late scarioso-marginatas apice longe acuminatas et flores 1–2 vel rariter ramos duos ad 1 cm. longos floriferos proferentibus; pedicellis 1–2 cm. longis ascendentibus maturitate recurvatis; sepalis 2 deciduis late ovatis subaequalibus 5–10 (saepe 7–8) mm. longis, apice acutis vel extus inconspicue tridentatis, margine angustissime scariosis, dorso costas 3–5 longitudinales inconspicuos gerentibus; petalis "aurantiacis" (in sicco plus minusve sanguineis), ut videtur saltem 25 mm. longis; capsula ovoidea 5–7 mm. longa 4–5.5 mm. crassa straminea 2–3-valva saltem 25 semina gerente; seminibus nigris opacis ad 1.7 mm. longis strophiolo albo donatis, costas multas concentricas prominentes angustas valliculis latitudine quam altitudine costarum saepe 2-plo (1–3-plo) majoribus separatas gerentibus, valliculis abundantissime transverse minute sulcatis.

CHIHUAHUA: 10 mi. west of El Pozo, road to Santa Eulalia, 4600 ft., fl. orange, Aug. 18, 1939, *Stephen S. White 2440* (TYPE, Gray Herb.).

Because of the broad leaves this species suggests a luxuriant form of *T. triangulare* Willd. It is, however, clearly a relative of *T. aurantiacum* Engelm., having the seeds, broad sepals, long peduncles, large ovoid capsules, orange petals and coarse stems which characterize the typical form of Engelmann's species. It differs from the latter, however, in being a more succulent and herbaceous plant with loosely and abundantly branched stems and very broad dark green leaves.

Vauquelinia heterodon, sp. nov.

Arbor 3–10 m. alta glabrescens; ramulis hornotinis brunneis; gemmis parvis albo-tomentosis; foliis juventate evanescenter albo-tomentosis mox glabris, maturitate glaberrimis viridibus subtus subpallidioribus; lamina anguste lanceolata vel lineari-lanceolata saepe 6–10-plo longiore quam lata, 7–12 cm. longa 7–20 mm. lata, infra medium (saepe basim versus) latiore, longitudine laminae quam petiolo gracili 3–4 mm. longo subtriplo vel rariter ad subquadruplo longiore, apice laminae acuta vel subacuminata, basi asymmetrica acuta vel obtusa, margine conspicue eroso-dentata (dentibus heteromorphis saepe glandulas gerentibus,

majoribus 1.5–3 mm. longis in utrinque marginibus saepe 10–15 donatis saepe 2–5 mm. distantibus, minoribus summum ad 1 mm. longis inter majores gestis), costa conspicua, nerviis primariis in facie inferiore laminae prominulis subparallelis ca. 1 mm. distantibus perspicue discretis, nervis secondariis perinconspicuis haud prominulis; inflorescentia sub anthesi glabra corymbosa 6–8 cm. diametro; hypanthio cupulato sub anthesi glabro; sepalis triangulari-ovatis erectis ca. 2 mm. longis quam hypanthio paullo longioribus, margine membranaceis saepissime pauci-denticulatis (denticulis glandulas capitatas proferentibus) sub anthesi plus minusve evanescenter tomentulosis; petalis late ellipticis 5 mm. longis albis sessilibus haud unguiculatis; staminibus glabris subulatis 5 et 6 mm. longis; ovariis dense strigosis; stylis 5 compressis clavatis 2 mm. longis; folliculis maturis adpresse villosis sepala 2–3 mm. longe superantibus.

COAHUILA: Caracol Mts., 21 mi. southeast of Monclova, Aug. 1880, *Palmer 329* (G, AA); Sierra Gavia, 40 mi. south of Monclova, tree frequent on canyon-sides and along the canyon-bottom, 3–8 m. tall, Aug. 1938, *Johnston 7217* (TYPE, Gray Herb.) near northern entrance of El Puerto de San Lazaro [Sierra Gavia], June 1936, *Wynd & Mueller 104* (G); Parras, Oct. 1910, *Purpus 4945* (G). TAMAULIPAS: Cerro de los Armadillos, near San Jose, Sierra de San Carlos, small tree on limestone, July 1930, *Bartlett 10207* (G).

This tree has been treated as a form of *V. corymbosa* Correa by Rydberg, No. Am. Fl. **22:** 260 (1908), and by Standley, Contr. U. S. Nat. Herb. **23:** 323 (1922). True *V. corymbosa,* however, is endemic to Hidalgo, and differs from *V. heterodon* in its less elongate, distinctly reticulate, more sparingly and saliently toothed leaves, proportionately longer petioles, and smaller fruit. Its range is separated from that of *V. heterodon* by San Luis Potosi and southern Tamaulipas. In this intermediate area the genus is represented by *V. Karwinskii* Maxim. (*V. latifolia* Rydb. is probably a synonym). The present species, *V. heterodon,* is most closely related to *V. angustifolia* Rydb., which extends from the Chisos Mts., in the Big Bend area of Texas, southwest to the San Eulalia Mts. near Chihuahua City. From this more western plant *V. heterodon* differs sharply in its less elongate, irregularly toothed, long-petiolate leaves, glabrous inflorescence and flowers, and usually gland-toothed sepals.

Eriosema laetum, sp. nov.

Planta fruticosa; ramis elongatis 4–6 dm. longis ad 3 mm. crassis molliter inconspicue pubescentibus, internodiis 5–9 cm. longis; stipulis

deciduis 7–8 mm. longis multistriatis molliter pubescentibus apice 2–3 mm. profunde dentatis dentibus acuminatis; rhachi folii 10–13 mm. longa 3–4 mm. supra basim jugum foliolorum gerente; foliolis 3 viridibus molliter inconspicue velutinis oblongis vel raro supra medium aliquantum latioribus, apice obtusis vel truncatis vel subemarginatis inconspicue apiculatis, basi rotundis vel plus minusve angulatis in petiolulum ca. 2 mm. longum abrupte contractis subtus costa et nervis pluribus ascendentibus prominulis ornatis, supra laete viridibus cum costa et nervis delicate impressis; foliolis lateralibus 5–8 cm. longis 1.8–3 cm. latis; foliolo terminali majore 5.5–8.5 cm. longo 2–3.5 cm. lato, petiolulo basi stipellato; racemis ex axillis superioribus rami orientibus; rhachi racemi floriferi gracili recta ca. 1 dm. longa quam folio suffulciente duplo longiore, internodiis 4–6 mm. longis; bracteis multistriatis ovatis acutis pubescentibus 5–7 mm. longis mox deciduis; floribus ca. 2 cm. longis; pedicellis ad 5 mm. longis stricte ascendentibus gracilibus; tubo calycis inaequali ca. 3.5 mm. profundo cupulato basi oblique rotundato; lobis calycis inaequalibus sparse setiferis, antico 6–7 mm. longo cuneato apice longe attenuato, basi ad 2 mm. lato, lateralibus 5–6 mm. longis oblique angusteque triangularibus, posticis 4–5 mm. longis; vexillo obovato 22 mm. longo 14 mm. lato, intus aureo glabro, extus sordido pubescente, apice emarginato, basi ca. 2 mm. longe lateque unguiculato; alis aureis quam carina 1–2 mm. brevioribus, ca. 20 mm. longis ultra medium 5.5 mm. latis apice rotundis, basi 2–2.5 mm. longe unguiculatis; carina 21 mm. longa lutescente glabra; ovario albo-strigoso; fructu ignoto.

SONORA: Cañon de Huepari, north of Aribabi, 4300 ft. alt., fl. yellow, Sept. 2–3, 1939, *Stephen S. White 2650* (TYPE, Gray Herb.).

This relative of *Eriosema grandiflorum* (C. & S.) Seem. grows in the Sierra Madre of northeastern Sonora and probably sets the northern limit for the genus in America. It differs from the widely ranging more southern *E. grandiflorum* in the lack of abundant fulvous indument (particularly on leaves and inflorescence), and in its greener obtusish oblong (rather than acute or acutish lance-oblong) leaflets, its golden yellow wings and standard which retain their bright color in drying, and its less hairy and distinctly shorter less elongate calyx-lobes. The plant is of a fresher brighter green than *E. grandiflorum* and the inflorescence does not become sordid and rufous when dry.

Cnidoscolus Shrevei, sp. nov.

Fruticulus 5–10 dm. altus; ramulis hornis 1–3 dm. longis 1–2.5 mm. crassis viridibus minute pubescentibus setas pallidas stimulosas rigidas

5–12 mm. longas divaricatas e basi bulbosa orientes sparse sed conspicue gerentibus, internodiis 5–15 (–25) mm. longis; petiolis 4–9 mm. longis pubescentibus non raro setis paucis armatis; lamina folii viridi crispa ca. 2.5–4 cm. lata et 2–2.3 cm. longa ad medium late trilobata (sinu acuto) praesertim petiolum versus pubescente (vetusta glabra), infra conspicue palmateque tricostata (costis prominulis pallidis nervos paucos rectos pallidos gerentibus setis paucis sparse armatis), basi late obtusa vel truncata, margine loborum conspicue graciliterque inciso-dentata, dentibus angustis 4–7 mm. longis attenuatis non raro curvatis setaceo-acuminatis (apice pallidis); stipulis minutis triangularibus 1–1.3 mm. longis deciduis anguste 3–5-lobulatis, lobulis glandulosis; inflorescentia axillari pauciflora inconspicua; pedunculo 5–10 mm. longo; floribus masculis ca. 1 cm. longis albis extus minute pubescentibus, lobis ovato-triangularibus obtusis inaequalibus 2–3 mm. latis 1.5–2 mm. longis extus pauce setosis, tubo elongato, staminibus monadelphis 6 (staminodiis nullis), filamentis 2.5 et 3.5 mm. longis (duobus interioribus longioribus et fortasse basim versus plus minusve connatis) in apice columnae staminalis gestis; columna ca. 2.5 mm. longa basim versus abrupte (hemisphaerica) expansa et pilos molles 1–1.5 mm. longos abundantes conspicue proferente alibi glabra, disco glabro carnoso annulato rubiginoso obscure 5-dentato; floribus femineis ca. 5.5 mm. longis albis extus pubescentibus, lobis latis ovato-triangularibus inaequalibus 1–1.5 mm. longis extus sparse setosis, tubo basim versus circumscisso (parte basali persistente), disco hypogyno annulari crasso margine interiore appendiculas subulatas 5 minutas gerente; ovario pubescente; stylis 3 medium versus bilobatis ca. 1.5 mm. longis, lobis compressis obovato-oblongis; fructu ignoto.

DURANGO: steep rocky slopes 7 miles southwest of Chocolate, woody at base, 2–3 ft. tall, 4225 ft. alt., Aug. 22, 1939, *Forrest Shreve 9104* (TYPE, Gray Herb.).

A very distinct new species belonging to the group CALYPTROSOLEN as defined by Pax. It is evidently related to *C. Palmeri* (Wats.) Rose, of Sonora and Baja California, but is conspicuously different in its smaller lobed short-petiolate strongly crisped lacerate-dentate leaves, bristly stems, smaller flowers, and fewer stamens. The leaves of this species are among the smallest in the genus. Their crisped blades are unique in *Cnidoscolus*.

Bernardia obovata, sp. nov.

Frutex ca. 1 m. altus viridis irregulariter ramosus dioicus; ramulis hornotinis viridibus pilos minutos stellatos gerentibus mox glabrescentibus et pallidis, vetustis glabris plumbeis vel brunneis; foliis alternis

viridibus obovatis vel raro subellipticis saepissime supra medium evidenter latioribus 7–15 mm. longis 5–12 mm. latis, apice obtusis vel rotundis, basi late acutis in petiolum 1–2.5 mm. longum contractis, margine sparse evidenter crenatis (in utroque latere dentibus 3–6 glanduliferis obtusis antrorsis supra medium laminae majoribus donatis), subtus costa et nervis 2–4-jugatis prominulis ornatis et pilis ramosis sparsis nullo modo congestis polymorphis (in forma et magnitudine variabilibus) donatis, supra subviridioribus pilis quam eis faciei inferioris saepe aliquantum minoribus et sparsioribus ornatis; stipulis crassis strictis oblique ovato-oblongis 0.8–1 mm. longis ca. 0.7 mm. latis, in sicco pallidis; inflorescentia mascula axillari, rhachi saepe 3–4 mm. longa bracteas 1–4 triangulari-cordatas ad 1 mm. longas 5–8-floras gerente pilis stellatis vestita; floribus femineis in alabastro angulato-subglobosis pilos paucos stellatos gerentibus, lobis ad anthesin 3(–4) obovatis ad 1.5 mm. longis et 1 mm. latis, pedicellis gracillimis 3–5 mm. longis subglabris; staminibus saepe 6 (5–8), filamentis ca. 0.5 mm. longis glabris non raro rosaceis, antheris ca. 0.15 mm. longis, connectivo apice rubiginoso, glandulis disci minutis obovoideis saepe ca. 5 rubiginosis; floribus masculis sessilibus solitariis; sepalis 3 ovato-cordatis 1–1.5 mm. longis ciliatis, prophyllis 2–3 ovatis brevioribus; disco annulari subnullo dentato perinconspicuo; ovario biovulato biloculari compresso dense stellato-pubescente; stylis 2 bilobis, lobis subulatis 1–1.5 mm. longis recurvatis integris; capsula ca. 7 mm. alta 9 mm. lata et 6 mm. crassa inconspicue pubescente; seminibus ad 5 mm. altis in facie axiali planis alibi alte convexis dorso apicem versus inconspicue carinatis, laevibus ecarunculatis.

CHIHUAHUA: El Pozo, Sierra de Santa Eulalia, shrub 1 m. tall, Aug. 1939, *S. S. White 2426* (G). TEXAS: mesa north of Chisos Mts., Brewster Co., 1065 m. alt., on arroyo bank, June 27, 1931, *Moore & Steyermark 3289* (TYPE, Gray Herb.); Green Gulch, Chisos Mts., rocky banks, *E. J. Palmer 34137* (AA); East Black Hill, Brewster Co., Apr. 21, 1928, *Cory 1873* (G); between Rio Grande and Eagle Spring, southern Hudspeth Co., hillsides, much branched shrub 2–3 ft. tall, June 21, 1852, *Wright 1807* (G).

A very distinct species which has been confused with *Bernardia myricaefolia* (Scheele) Wats. It occurs in the mountains near the Rio Grande in trans-Pecos Texas and in northern Chihuahua, in the territory between that occupied by true *B. myricaefolia* and the recently recognized *B. incana* Morton, of Arizona and California. The species is readily recognized by its sparingly hairy green obovate leaves and 2-celled fruit. It has the simple style-branches and the few stamens of

B. incana and is probably most closely related to that western plant, but differs decisively from it by its lack of a pale dense indument, elongate leaves, trilocular fruit and dark stipules. It differs from *B. myricaefolia* in its less elongate concolored (rather than bicolored) leaves, its sparser indument, thick stipules, glabrescent male flowers, much fewer stamens, smaller less hairy bilocular fruit, and simple style-branches. True *B. myricaefolia* is a plant of central and southern Texas and does not extend west to the Pecos. In Mexico it ranges far south into Tamaulipas and west into the Monclova area of northeastern Coahuila.

Leucophyllum virescens, sp. nov.

Frutex subvirescens; ramulis pallidis pilis stellatis minutis abundantibus adpressis vestitis, internodiis 1–5 mm. longis; foliis ad 1 cm. longis virescentibus pilos stellatos et glandulas capitatas minutissimas gerentibus, lamina obovata 3.5–5.5 mm. lata, apice rotundata vel obtusa rariter emarginata, supra medium latiore deinde basim versus gradatim contracta; petiolo vix differentiato vel ad 1 mm. longo; foliis inferioribus ramulorum hornorum pilis compositis ramos 3–4 divaricatos 0.1–0.25 mm. longos gerentibus haud dense vestitis; foliis superioribus novellis ramulorum pallidioribus pilis 3–4-plo minoribus abundantioribus congeste breviterque multiramosis stellatis (eisdem pilis ramulorum pedicellorum et calycium persimilibus) dense vestitis; pedicellis 2–4 mm. longis gracilibus pallidis; calycibus ad 4 mm. longis, lobis inaequalibus linearibus vel lineari-lanceolatis 0.5–0.7 mm. latis extus minute abundanterque stellatis pallidis, intus viridibus glabris; corolla (in sicco caerulea) ad 18 mm. longa e basi gradatim ampliata, lobis 5–6 mm. longis intus piliferis; filamentis 4 glabris ca. 4 et 6 mm. longis; ovario glabro vel apicem versus pilos paucos gerente; stylo sparse pilifero; fructu ignoto.

DURANGO: near La Loma, valley of the Rio Nazas, 4000 ft. alt., Aug. 22, 1939, *Shreve 9101* (TYPE, Gray Herb.).

This is a species related to *L. minus* Gray, but differs in having broad greenish leaves of which the lowest on each shoot are clearly opposite and in displaying a marked difference in the form and abundance of the trichomes between the young and old leaves of the same shoot. The older leaves have large trichomes similar to those of *L. ambiguum* while the trichomes of the young leaves are smaller and suggest those of *L. minus*. The trichomes are much less abundant than in either of the two species mentioned. The older leaves become distinctly green above.

Leucophyllum zygophyllum, sp. nov.

Frutex ramosissimus ramos et folia opposita vel subopposita gerens;

partibus juvenilibus dense pallideque tomentosis, pilis abundantissimis elongatis verticillas plures ramorum brevium superimpositas gerentibus; foliis concoloribus firmis medio-costatis, lamina orbiculari vel late obovata 4–7 mm. longa 4–6 mm. lata, apice rotundata vel obtusa, basi rotunda vel late acuta, in petiolum 1–1.5 cm. longum abrupte contracta; internodiis ramuli minus quam 5 mm. longis; calyce 4–5 mm. longo, basi rotundato, 2 mm. longe pedicellato, lobis oblongis (lobo breviore latissimo ad 1.4 mm. lato) extus tomentosis intus apicem versus tomentosis alibi glabris; corolla purpurea 12–15 mm. longa intus sparse pilifera, lobis ad 5 mm. longis, filamentis 4 et 4.5 mm. longis sparse piliferis; ovario subglabro vel tomentoso; stylo glabro vel sparse pilifero; fructu ignoto.

COAHUILA: El Berrendo near Muzquis, 1200 m. alt., fl. purple, "Ceniz," July 15–16, 1939, *Stephen White 1799* (G). NUEVO LEON: Puerto de Pastores, southeast of Galeana, 2100 m., abundant on some limestone slopes, Aug. 2, 1934, *C. H. & M. T. Mueller 1299* (TYPE, Arn. Arb.).

This species differs from all its known congeners in having evident and consistently opposite or subopposite leaves. Though smaller in size, the leaves in their outline and dense pale tomentum much suggest those of *L. frutescens* (Berl.) Johnston. The corolla in size and form is much like that of *L. minus* Gray. The dense pale tomentum which covers the leaves, calyx and leaf-bearing branches, is composed of complex elongate trichomes formed of a central axis bearing numerous superimposed whorls of short branches. Similar trichomes are found on the pedicels of *L. frutescens*. As with the other species of the genus there is considerable variation observable in the amount and distribution of hairs within the flower. The type specimen, from Nuevo Leon, has a distinctly tomentose ovary and a piliferous style, whereas in the material from Coahuila the style and ovary bear few, if any hairs, and the inner surfaces of the corolla have fewer hairs than in the type. In all other details the two collections show close agreement and I am confident that they are conspecific. The species is a very distinct and interesting addition to its genus.

Tecoma incisa (Rose & Standl.), comb. nov.

Stenolobium incisum Rose & Standl. Contr. U. S. Nat. Herb. **16**: 174 (1913).

Tecoma stans var. *angustatum* Rehder, Mitt. Deutsch. Dendr. Ges. **1915**: 227 (1915).

The present plant, a small bush with narrow incised-toothed glabrous leaflets and elongate corollas, is the only representative of its genus over

most of northern Mexico. Since it is readily recognizable and has a distinct range I believe it merits specific recognition. It ranges from Nuevo Leon, northern Zacatecas and central Durango north into western Texas and southern New Mexico and west along the international boundary into northeastern Sonora and southern Arizona. True *T. stans* (L.) HBK., with which it has been confused, in northern Mexico is a plant of the coastal districts, reaching north to Tamaulipas and central Sonora. South of the range of *T. incisa* the genus is represented by *T. mollis* HBK. Neither *T. stans* nor *T. mollis* have ranges which overlap that of *T. incisa*.

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OLD FIELD FORESTS OF SOUTHEASTERN NEW ENGLAND

HUGH M. RAUP

With one text-figure

MOST of the original forests of Rhode Island, and of Massachusetts and Connecticut east of the Berkshires were removed prior to the middle of the 19th century. The process of removal was a progressive one, beginning with the early settlements in Massachusetts Bay and the Connecticut Valley. The upland of central and northern Massachusetts and the less desirable portions of upland Connecticut were probably the last to be cleared. The removal of the original forests of this district has since become well nigh complete, as Bromley ('35) has recently shown.

The relative areas of old field timber and that which has arisen as a result of the removal of original stands without complete eradication differ in various parts of the country, but during the middle 1800's the amount which was actually clear was far greater than that in woodland. The town of Petersham, though not as old as many other communities in southern New England, has been estimated to have had 60 to 70% of its land surface under cultivation or in pasture during this period. Recent studies of land use in the town of Petersham show these to be conservative figures. Consequently the importance of old field timber in our region is clear, if for no other reason than sheer volume.

The development of forests in old fields has been investigated with greatest intensity by students of the Harvard Forest School in Petersham and neighboring towns, and by those of Yale University in Connecticut. A number of papers have been published in recent years describing the situation in these two sections of southern New England, and since they show some notable contrasts, the general results will be briefly summarized here. (See Fisher, '18, '25, '33; Spaeth, '20; Griffith, Hartwell & Shaw, '30).

On the better upland soils of central Massachusetts the old fields, when abandoned, became seeded into nearly pure stands of white pine. This process went on progressively during the latter half of the last century, but the general decline in New England agriculture about the middle of the 1800's brought a concentration of abandonment during that period. As a result, vast areas of white pine forests reached commercial maturity

in the late 1800's and the first ten or fifteen years of the twentieth century. The prevalence of this type was so great that students of American forests during the latter half of the century regarded most of eastern Massachusetts and parts of northeastern Connecticut and Rhode Island as a "white pine region." That is, white pine was regarded as a widespread native type.

At the time these forests reached maturity they became a major source of wealth in New England, and were largely removed. Contrary to expectation, however, they generally did not reproduce themselves except on light sandy or gravelly soils. A common sight in remnants of these old field pine stands is a growth of young native hardwoods which seed in under the pines. They do not appear until the pine forest has reached the age of about 40 or 50 years. Presumably, if such stands were left to themselves, the hardwoods would eventually crowd out the pines. Cases where this has happened are rare, however, because the pine has been removed for lumber before the final stages have been reached.

The young hardwoods which appear in this manner in central New England are chiefly red oak, hard maple, red maple, white ash and black birch. There are a few white oaks, beeches, lindens, ironwoods, greater or less numbers of gray birch, and some white birch. The removal of the old field pine stands at commercial maturity has brought about young stands of hardwoods of approximately the above composition over large areas in central Massachusetts (McKinnon, Hyde & Cline, '35). This is the forest commonly seen as one travels through this section. It is broken here and there chiefly by remnant stands of old field pines, or by young stands of pine on newly abandoned land. Sand plains and gravel terraces are characterized by pitch and white pines, while lowlands have typical swamp forests. Ravines and some rich lowland soils, particularly on northern exposures, will have forests of the more northern hardwoods and hemlock. Southern exposures will show relatively more white oak and some hickory. Old field forest successions in this region, therefore, may be designated as of white pine and hardwoods.

Old field forests in Connecticut have been studied extensively by Dr. H. J. Lutz of the Yale School of Forestry ('28). He has outlined the succession which occurs on old field areas from which the former forest has been completely eradicated. The initial woodland association, not only on these sites, but also on the poorer sites which have been severely disturbed though not entirely cleared, is one of red cedar and gray birch. As this association approaches maturity it is gradually replaced by other hardwoods, notably white, black and red oak, hickory, red maple and black birch.

As one travels southward through southern Massachusetts and Connecticut, old field associations of red cedar and gray birch are common sights. Since neither of these trees has ever proved as commercially valuable as white pine, it is not unusual to see stands wherein a gradual change is taking place from the old field type to one of the hardwoods mentioned above. The cedars grow old, become decrepit, and finally disappear among the vigorous hardwoods without being able to perpetuate themselves.

A somewhat similar type of succession is to be seen in parts of southern New York state, particularly on soils derived from the Paleozoic rocks. At the northern base of the Hudson Highlands, in Orange Co., old fields first develop a red cedar association which is usually followed by white ash.

TEXT FIGURE 1

The dotted line shows the approximate boundary between the more southern, old field red cedar — gray birch association and the northern old field white pine.

Between northern Massachusetts and southern Connecticut there is also a notable transition in the types of sand plain timber. In most of Massachusetts the pitch pine is the commonest species on these habitats. On the sand plains of central and southern Connecticut, on the other hand, black, red and white oaks also become prominent (Olmsted '37).

Although the two types of old field succession described above have long been recognized, so far as the writer is aware no one has attempted to draw up a tangible boundary or transition zone between them. It has seemed that there should be no particular difficulty in doing this since the two types may be easily and quickly recognized in the field. The map accompanying this paper contains a tentative boundary between

these two old field types. Data for it have been acquired on various trips back and forth through the country around Boston and in the country to the southwest.

The approximate northeastern limit of the red cedar—gray birch association appears to be at the lower Merrimac between the city of Lowell and the coast. No occurrences of it have been found in southern Maine or southeastern New Hampshire although the cedar occurs sporadically in these areas. Southward from the vicinity of Lowell it passes west of Concord and through the town of Maynard. It is the characteristic old field association in the Boston basin. Old photographs taken in the Arnold Arboretum during the period of its construction in the 1880's show this complex very clearly. Southwest of the Boston basin the boundary takes a zigzag course to the northeastern corner of Connecticut. There appear to be northern extensions of the cedar—gray birch community between Milford and Uxbridge, and between Douglas and Webster. These probably extend northward to the latitude of Worcester, as the type appears along the Worcester turnpike west of Framingham. To the southwest and south of Boston there is a considerable area in which the transition is gradual. This is evident for instance in the country between Foxboro and Taunton and between Stoughton and Easton, where white pine and red cedar are freely mixed in old fields or occur alternately. There is much light soil here, however, with an abundance of pitch pine. The light soils favor the development of pine throughout the region, and probably account for the mixture here. Similar soils on most of Cape Cod have the same effect, and old field cedar is not highly developed there. At the northeastern corner of Connecticut the boundary winds southward at least as far as South Woodstock and Westford. It then turns westward, passing south of Stafford Springs and Somers to the Connecticut Valley.

It must be understood that this boundary cannot be designated as a line but rather as a transition, often many miles wide. Pine-hardwood types appear far south of it in suitable situations such as northern slopes, while the cedar-birch type may be found somewhat farther north, usually on southern slopes.

In western Massachusetts, northwestern Connecticut, and in the Connecticut Valley, the red cedar is commonly associated with the trap ridges and with limestone outcrops. It appears to be a pronounced calciphile in these parts. The absence of basic rocks in eastern Massachusetts, Connecticut and Rhode Island, however, necessitates looking for other factor complexes to account for its dispersal.

There seems to be no direct correlation with the boundaries commonly

drawn between the physiographic provinces of southern New England (Wright, '33). Although in eastern Massachusetts the cedar-gray birch association is largely confined to the coastal lowland and basin provinces, in Connecticut it is also well-developed on the eastern and parts of the western uplands. Likewise it is difficult to find a close relationship to such frost phenomena as are shown in a map of average growing seasons (Wright, '33), although it should be noted that the general configuration of the isopleth for 160 days bears some resemblance to our forest boundary. There are long northern extensions of it up the Connecticut valley and into Massachusetts east of Worcester, as well as in the Boston Basin and the lower Merrimac valley. In eastern Connecticut, however, the cedar—gray birch type covers an area where the average growing season drops to 130 days.

For many years there has been recognized a faunal region in southern New England, the northern limit of which also resembles our forest boundary in general configuration (cf. Forbush, '27). This region has been described as "Transition, with traces of Carolinian," following the system of Merriam. It has a long extension up the Connecticut River valley nearly to central Massachusetts, and another up the valley of the Blackstone River into southern Massachusetts. Along the coast it extends north to the mouth of the Merrimac, involving much of the Boston Basin. If the northern limit of this faunal region could be moved northward and northwestward, therefore, it would nearly coincide with the boundary between old field pine and cedar.

It has been noted above that all of eastern Massachusetts, a part of northeastern Connecticut, and northern Rhode Island have long been placed by foresters in the white pine region (Hawley & Hawes, '12; Sargent, '84; Fisher, '33; Bromley, '35). The current prevalence of hardwood forests over much of this region, and the recognition of white pine as a transient, old field type except on very light soils, raises the problem of forest classification among the hardwoods. The need for such a reclassification here has been dealt with briefly in a recent paper by Behre, Cline & Baker ('36). Are different types represented in this area, and if so how are they related to the primeval stands which occurred here in pre-colonial times? The nature of our original forests is of considerable importance in working out management plans for the rehabilitation of our woodlands. Whether the purposes involved are watershed protection, the development of recreational facilities, or the production of merchantable timber, the problems involved would be simplified if we knew what the natural production was under primitive conditions, both in the distribution of stand composition and of quality.

Foresters have classified the deciduous types of central Massachusetts and southern New Hampshire as "Transition Hardwoods" (Spaeth, '20). They consist principally of red oak, white ash, sugar maple, red maple and black birch, and form a broad transition from the "Northern Hardwoods," in which beech, sugar maple and yellow birch predominate, to the "Sprout" or "Central Hardwoods" of Connecticut. The latter are characterized by the abundance of white oak, black oak and hickory. It should be noted that the hardwoods following white pine and cedar in the old field successions are those of the "Transition" and "Central" groups, respectively, and it is suggested that the pine-cedar boundary may be used to divide the two in southeastern New England.

It is further suggested that the same boundary may be a reflection of fundamental differences in growing conditions which were effective in the primeval forests of this region. What the actual habitat differences were is difficult to determine, although the attempted correlations noted above suggest that they were climatic rather than edaphic. Pollen studies in Connecticut noted below, also indicate a climatic interpretation.

Recent studies of ancient vegetation in southern New England give reason to believe that much of Connecticut, Rhode Island, and southern Massachusetts east of the Berkshires had a rather open forest of oaks, hickories and chestnuts (Bromley, '35; Raup, '37). There is some evidence that in precolonial times the oak-hickory type extended somewhat farther northward in Massachusetts than the present stands would indicate although there are still present what may be regarded as modified descendants from it (Raup, '37). Recent investigations of pollen in southern Connecticut lake sediments tend to bear out the suggestion that a southern, oak-hickory forest has been in part replaced by an oak-chestnut type, and that farther inland the hemlock has shown an increase (Deevey, '39).

It seems fairly well established, therefore, that oak forests of "Central Hardwood" character, associated with hickory, were present in southern New England when the colonists arrived, that they were tending toward slightly greater mesophytism than had existed earlier, and that somewhere in Massachusetts or northern Connecticut was a transition to more northern hardwood types. It is not impossible that the present boundary between the old field pine and the cedar-gray birch associations reflects the ancient transition noted above. If, however, there was an element of persistence in the presence of oak-hickory forests in southern Massachusetts and northern Connecticut at the time of colonial clearing,

then it is reasonable to think that the present boundary is somewhat farther south than the ancient one. The present occurrence of considerable white oak, black oak and hickory in southern Massachusetts, and, the early description of oak-hickory types in southern and central Worcester County in the eighteenth century (cf. Whitney, 1793) lend weight to the latter view.

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TWO NEW SPECIES OF ROSA FROM FUKIEN AND KWANGSI

FRANKLIN P. METCALF*

Rosa lasiosepala, sp. nov.

Frutex scandens ad 10 m. altus: foliis 5-foliolatis; foliolis breviter petiolatis, ellipticis, 6–9 cm. longis, ad 4 cm. latis, acute serratis, acuminatis, basi obtusis, rotundatis, supra glabris et minute prominenter reticulatis, subtus obscure reticulatis et minute punctato-glandulosis; petiolulis costaque subtus in foliis novellis villosis; stipulis ciliatis: inflorescentiis subpaniculatis corymbosisque, villosis; floribus albis; calycis lobis reflexis, lanceolatis, dense albo-tomentosis; stylis in columnam coalitis, villosis: fructibus immaturis, 3–4 mm. latis, 10 mm. longis.

KWANGSI: Chu Feng Shan, 30 li S. W. of Shan Fang, N. Luchen, June 2, 1928, *Ching 5854*, TYPE, "4000 ft., in thickets, strong tall climber, 30 ft., flowers said to be white." (Lingnan University.)

A very distinct species, the type resembling in general appearance *R. glomerata* Rehder and Wilson (Wilson 1306), from Szechuan, but easily distinguished from that species by the glabrous serrate leaves. *Rosa glomerata* R. & W. has similar stipules, villous style and inflorescence, but the leaflets are entire and distinctly puberulent beneath.

The type of *R. lasiosepala* was originally determined and distributed as *R. Gentiliana* Lévl. & Vant., the name applied in the sense of Rehder and Wilson in Sargent, Pl. Wils. **2**: 312 (1915), which is now *R. Henryi* Boulenger. *Rosa Henryi* can, however, easily be distinguished from *R. lasiosepala* by the glandular pedicels and receptacle. The sepals also are narrowly lanceolate and glandular pubescent outside, which is not the case in *R. lasiosepala*.

The new species might make a good ornamental.

Rosa (§ Indicae) **fukienensis,** sp. nov.

Frutex erectus: foliis 5-foliolatis; foliolis breviter petiolatis, ellipticis (3.5–5 cm. longis, ad 2 cm. latis), crenato-serratis, acuminatis vel acutis, basi obtusis vel oblique obtusis, glabris, supra opace viridibus, reticulatis, subtus pallidioribus, obscure reticulatis; stipulis linearibus, anguste

*Contribution from the Botanical Survey, Lingnan University, Canton, China.

lanceolatis, sparse villosis, margine glanduloso-ciliatis; petiolis rhachibusque glabris, sparse aculeatis: inflorescentiis corymboso-paniculatis, glabris, densifloris, petalis ignotis; stylis exsertis, liberis, villoso-sericeis; staminibus numerosis, reflexis, exterioribus dense tomentosis; sepalis lanceolatis pinnatifide lobatis: fructibus subglobosis (5 mm. longis, 7 mm. latis), glabris.

FUKIEN: without locality, *Chung 6425*, TYPE, (Arnold Arboretum).

A peculiar species undoubtedly belonging to the section INDICAE, characterized by exserted free styles, but resembling *R. Henryi* Boulenger (*R. Gentiliana* Rehder & Wilson, non Lévl. & Vant.) in general appearance. The type specimen was distributed as *R. Gentiliana* Lévl. & Vant. but that species has adnate stipules and glabrous styles, forming a column. *Rosa fukienensis* does not seem to be closely related to any of the species of the section INDICAE. The prominently villous to silky styles and the pinnately lobed calyx, which is reflexed, so that the inside whitish tomentose surface is prominently exposed, are characteristic.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

NEW SPECIES, VARIETIES AND COMBINATIONS FROM THE COLLECTIONS OF THE ARNOLD ARBORETUM

ALFRED REHDER

Magnolia Soulangeana Soul.-Bod. f. **rubra** (Nichols.), comb. nov.

Magnolia rustica rubra Nicholson in Flora & Sylva, **1**: 17, pl. (1903), "M. rustica fl. rubra" sub tab.— Millais, Magnol. 210 (1927).

Magnolia Soulangeana var. *rustica* Rehd. in Bailey, Stand. Cycl. Hort. **3**: 1969 (1916).

This form was found about 1893 in a nursery in Boskoop and was subsequently distributed by Mr. Wezelenburg of the Hazerswoude Nurseries as *M. rustica fl. rubro.* It was supposed to be a seedling of *M. Soulangeana* var. *Lennei* (Topf) Rehd. from which it differs chiefly in its smaller flowers of clear rosy red, not purplish color.

Malus baccata (L.) Borkh. f. **columnaris**, f. nova.

A typo differt ramis erectis elongatis comam angustam columnarem formantibus, foliis ellipticis 6–9 vel in turionibus ad 12 cm. longis, floribus ad 4.5 cm. diam.

ARNOLD ARBORETUM: Cult. sub no. 22032; flowers coll. May 24, 1939, *A. Rehder;* fruit Sept. 26, 1939, *A. Rehder & D. Wyman.*

Grafts of this form were received from the Royal Botanic Gardens at Kew in 1927 under a wrong name. The one tree planted in the collection is now about 6 m. tall and the columnar head measures about 1 m. in diameter. In its large leaves and flowers, it resembles *M. baccata* var. *Jackii* Rehd. and may be considered a columnar form of that variety.

Sorbus Prattii Koehne f. **subarachnoidea** (Koehne), comb. nov.

Sorbus munda Koehne f. b. *subarachnoidea* Koehne in Sargent, Pl. Wilson. **1**: 469 (1913).

Sorbus Prattii Koehne var. *tatsienensis* (Koehne) Schneider in Bot. Gaz. **63**: 404 (1917), pro parte, quoad syn. *S. munda* f. *subarachnoidea.*

Pyrus munda subarachnoidea Gibbs in Gard. Chron. ser. 3, **68**: 153, fig. (1920).— Bean, Trees Shrubs Brit. Isles. **3**: 326, t. (1933).

Sorbus Prattii Koehne sensu Sealy in Bot. Mag. **159**: t. 9460 (1936), quoad plantam depictam.

This form differs from typical *S. Prattii* chiefly in the rufous thin cobwebby pubescence of the under surface of the leaflets which are somewhat more numerous (25–27) and smaller (about 1.5 cm. long) than generally in *S. Prattii;* it is apparently only a rather slight form of that variable species. It was introduced by E. H. Wilson in 1910, the plants

in cultivation having been raised from seeds of his type number. Whether typical *S. Prattii* and var. *tatsienensis* are in cultivation, I do not know; I have seen, so far, no cultivated plants or specimens from cultivated trees of that variety or of the type of the species.

Rosa pomifera Herrm. f. **duplex** (Weston), comb. nov.

Rosa villosa L. [var.] 3. *duplex* Weston, Bot. Univ. **1**: 252 (1770).
Rosa villosa B. Lawrance, Coll. Roses. t. 29 (1799).
Rosa villosa (*Pomifera*) *fl. multipl.* Thory in Redouté, Roses, **2**: 40 (1821); ed. 2, livr. 18, c. [2] (1824); ed. 3, **2**: groupe 12 (1835).
Rosa pomifera var. Willmott, Gen. Rosa, **2**: 436, pl. (1912).

As the name *R. villosa* L. has been proposed as a nomen ambiguum and probably will be confirmed as such, the next oldest name which is *R. pomifera* Herrm. will have to be taken up for this species. This makes necessary the new combination proposed above.

Rhus glabra L. var. **cismontana** (Greene) Cockerell in Daniels f. **flavescens** (D. M. Andrews), comb. nov.

Rhus cismontana flavescens D. M. Andrews, New or Notew. Pl. [Rockmount Nurs.] p. 5 (1922).

From *Rhus glabra* var. *cismontana* this form differs in the yellow fruit and the yellow autumn coloring of its foliage. The var. *cismontana* is one of the numerous variations of *Rh. glabra* described by Greene as distinct species; it differs from typical *Rh. glabra* chiefly in the smaller and narrower, less numerous leaflets, lighter green above and only glaucescent, not glaucous beneath, and in the smaller pyramidal inflorescence. The forma *flavescens* was discovered by Mr. D. M. Andrews in Boulder County, Colorado, some years before 1922 and transplanted to his nursery in Boulder. A plant of it was sent in 1925 by Mr. Andrews to the Arnold Arboretum where it has flowered and fruited.

Symphoricarpos orbiculatus Moench f. **leucocarpus** (D. M. Andrews), comb. nov.

Symphoricarpus vulgaris leucocarpa D. M. Andrews, 1926 Cat. Rockmount Nursery, 11. (1926).

A form differing from the type in its somewhat smaller greenish white flowers, white fruits and leaves of paler green. Plants of this form which were received also from other sources later than 1926 are growing in this Arboretum; whether these came originally from the Rockmount Nursery or originated independently, I do not know. The original plant of this form was probably found wild by Mr. Andrews like the preceding form.

Herbarium, Arnold Arboretum,
Harvard University.